U.S. Army Research Institute
for the Behavioral and Social Sciences

Research Report 1575

An Annotated Bibliography of the Aircrew Selection Literature

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Ministry of Defence

September 1990

U.S. ARMY RESEARCH INSTITUTE FOR THE BEHAVIORAL AND SOCIAL SCIENCES

A Field Operating Agency Under the Jurisdiction of the Deputy Chief of Staff for Personnel

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UNCLASSIFIED
SECURITY CLASSIFICATION OF THIS PAGE

REPORT DOCUMENTATION PAGE

Form Approved
OMB No. 0704-0188

1a. REPORT SECURITY CLASSIFICATION Unclassified	1b. RESTRICTIVE MARKINGS --
2a. SECURITY CLASSIFICATION AUTHORITY --	3. DISTRIBUTION/AVAILABILITY OF REPORT Approved for public release; distribution is unlimited.
2b. DECLASSIFICATION/DOWNGRADING SCHEDULE --	
4. PERFORMING ORGANIZATION REPORT NUMBER(S) ARI Research Report 1575	5. MONITORING ORGANIZATION REPORT NUMBER(S) --
6a. NAME OF PERFORMING ORGANIZATION U.S. Army Research Institute AVSCOM Element 6b. OFFICE SYMBOL (If applicable) PERI-IRA	7a. NAME OF MONITORING ORGANIZATION U.S. Army Research Institute Aviation R&D Activity
6c. ADDRESS (City, State, and ZIP Code) 4300 Goodfellow Blvd., St. Louis, MO 63120-1798	7b. ADDRESS (City, State, and ZIP Code) ATTN: PERI-IR Fort Rucker, AL 36362-5354
8a. NAME OF FUNDING/SPONSORING ORGANIZATION U.S. Army Research Institute for the Behavioral and Social Sciences 8b. OFFICE SYMBOL (If applicable) PERI-I	9. PROCUREMENT INSTRUMENT IDENTIFICATION NUMBER --
8c. ADDRESS (City, State, and ZIP Code) 5001 Eisenhower Avenue Alexandria, VA 22333-5600	10. SOURCE OF FUNDING NUMBERS PROGRAM ELEMENT NO.: 63007A PROJECT NO.: 793 TASK NO.: 1210 WORK UNIT ACCESSION NO.: H1

11. TITLE (Include Security Classification)
An Annotated Bibliography of the Aircrew Selection Literature

12. PERSONAL AUTHOR(S)
Hunter, David R. (ARI); Burke, Eugene F. (Ministry of Defence)

13a. TYPE OF REPORT	13b. TIME COVERED	14. DATE OF REPORT (Year, Month, Day)	15. PAGE COUNT
Final	FROM 88/10 TO 90/05	1990, September	

16. SUPPLEMENTARY NOTATION
E. F. Burke, Science 3b (AIR), Ministry of Defence, United Kingdom, Lacon House, Theobalds Road, London W.C. 1X 8RY.

17. COSATI CODES			18. SUBJECT TERMS (Continue on reverse if necessary and identify by block number)	
FIELD	GROUP	SUB-GROUP		
05	09		Pilots	Bibliographies
05	08		Aircrew	Personnel selection
			Selection	Testing

19. ABSTRACT (Continue on reverse if necessary and identify by block number)

This report summarizes the literature dealing with aircrew selection research conducted through 1989. It includes English language reports available from the open literature and from the United States, United Kingdom, and other armed services. Over 200 studies were identified using computer-assisted and manual searches of the bibliographic data bases and primary and secondary sources. These studies were categorized by selection measure used. Summaries of the studies were provided.

20. DISTRIBUTION/AVAILABILITY OF ABSTRACT	21. ABSTRACT SECURITY CLASSIFICATION	
☒ UNCLASSIFIED/UNLIMITED ☐ SAME AS RPT. ☐ DTIC USERS	Unclassified	
22a. NAME OF RESPONSIBLE INDIVIDUAL David R. Hunter	22b. TELEPHONE (Include Area Code) (314) 263-2407	22c. OFFICE SYMBOL PERI-IRA

DD Form 1473, JUN 86 *Previous editions are obsolete.*

SECURITY CLASSIFICATION OF THIS PAGE
UNCLASSIFIED

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Office, Deputy Chief of Staff for Personnel
Department of the Army

September 1990

Army Project Number
2Q263007A793

Human Factors in Training and Operational Effectiveness

FOREWORD

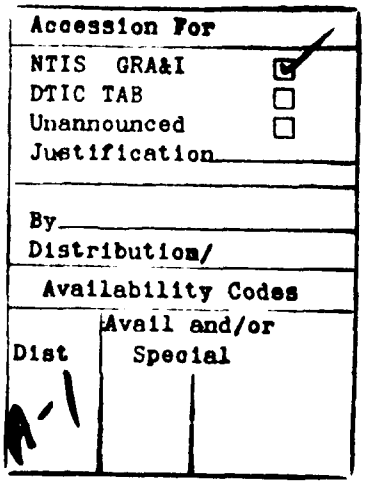
The development of scientific knowledge is an incremental process. Each new bit of information adds to that which preceded it and expands our knowledge of the world. However, for new knowledge to have the most illuminating effect, and to avoid needless duplication of effort, a thorough familiarity with that which has gone before is essential. This is certainly true in the area of aircrew selection research. Yet, the very nature of this research and its limited general interest outside of the armed services restricts the dissemination of research results to internal technical reports and other documents with very limited distribution. A comprehensive knowledge of what has been accomplished in this area is often difficult to obtain.

This report will make a singular contribution toward alleviating this problem. The authors have conducted an exhaustive search of the literature and have provided citations for every relevant reference--particularly those reports produced by the armed services of the United States and the United Kingdom. Other researchers may find this the only source of information on the results of otherwise inaccessible studies.

This bibliography was compiled by the Aviation Systems Command Element of the Army Research Institute Aviation Research and Development Activity in collaboration with Science 3 (Air), United Kingdom Ministry of Defence.

The report will be made available to other researchers in the field of aircrew selection and will also be used to guide Army research aimed at improving aviation system designs through better specification of the abilities and attributes of aircrew members.

EDGAR M. JOHNSON
Technical Director



AN ANNOTATED BIBLIOGRAPHY OF THE AIRCREW SELECTION LITERATURE

EXECUTIVE SUMMARY

Requirement:

This report summarizes the literature dealing with aircrew selection research reported through 1989. It includes English language reports available from the United States, United Kingdom, and other armed services and those references available in the general literature.

Procedure:

A search of the computer data bases and a manual search of armed service bibliographies, Psychological Index, and reference lists of all citations was conducted. The general criterion for inclusion in this study was the description of some process or measure being used or being considered for use for aircrew selection or classification. This criterion was loosely applied, however, in order to obtain a thorough representation of the available literature. Aircrew in this case refers primarily to pilots, although some studies dealing with navigators were included.

Results:

Over 200 studies dealing with aircrew selection were located. These studies were categorized by selection measure used. Summaries of the studies are provided.

Organization of the Report:

The report provides summaries of each study, in particular giving sample sizes, predictors, and validity coefficients for studies. An author index and tables categorizing each study by major selection measure are also provided.

AN ANNOTATED BIBLIOGRAPHY OF THE AIRCREW SELECTION LITERATURE

CONTENTS

AN ANNOTATED BIBLIOGRAPHY OF THE AIRCREW SELECTION LITERATURE

INTRODUCTION

The training programs for aircrew (pilots, in particular) are undoubtedly among the most costly of those conducted by the various military services. The minimum cost for production of a single pilot is on the order of $100,000. At the other end of the scale, fully trained operational jet transport pilots represent an investment of well over $1,000,000. Because of the costs involved, and also because of the responsibilities of aircrew, a great deal of research has been conducted to improve aircrew selection so as to minimize wastage in training and maximize operational performance.

Many efforts are currently underway both in the United States and abroad to improve aircrew selection. In addition, cooperative studies are being conducted both nationally among air, land, and naval services and internationally among the North Atlantic Treaty Organization member nations and in smaller bilateral efforts.

In order for these and future efforts to build upon previous experiences and avoid needless duplication and unintended replication, a comprehensive review of previous research efforts is required. Surprisingly, in view of the sustained interest in aircrew selection over the years, there has been only one report which was explicitly aimed at a review of this literature (North & Griffin, 1977), although others (e.g., Imhoff & Levine, 1981; Levine & Tupes, 1952; Passey & McLaurin, 1966; Youngling, Levine, Mocharnuk, & Weston, 1977) provide at least a partial review as part of the background for specific studies.

This annotated bibliography, in conjunction with an integrative review (Hunter, 1989) that describes in more detail many of the major studies, should provide researchers with a comprehensive source for information on this research area. The need for consolidated sources is especially critical for aircrew selection research because of the difficulties encountered in obtaining primary sources. Relatively few studies of aircrew selection are published in the open, professional literature. For the most part, these studies appear in technical reports produced by the military services or the contractor who performed the study for a government agency. Proceedings of the meetings at which papers in this area are presented are exceptionally difficult to obtain, and often major meetings are held with no proceedings ever published. The only source in that case is the author, given that one even learns of the existence of a paper and the identity and address of the author. All of these reports, papers, and presentations may or may not appear in the conventional abstracting services and computerized reference retrieval systems.

Because of the difficulties in obtaining the primary references, and the likelihood that many of the studies cited in this report may be irretrievable, this annotated bibliography attempts to:

1. Provide an exhaustive, definitive listing of all research conducted on aircrew selection to date.

2. List the predictor measures and the criterion in each predictive validity study.

3. Reproduce every predictive validity correlation and the corresponding sample size.

4. Summarize the major results of each study.

APPROACH

Search Procedure

A comprehensive search of the scientific literature was undertaken to identify all references dealing with aircrew selection. The primary search terms used were: pilot; aircraft pilot; aircrew; and, selection test. Several sources were used for this search including scientific journals, books, proceedings of various technical meetings, annual reports and bibliographies produced by military services, and technical reports.

In an attempt to be as broadly inclusive as possible, the criterion for inclusion in the bibliography was deliberately lax. Any study dealing with development and validation of a predictor of aircrew performance in training or in an operational setting was included. In addition, some studies that dealt with related issues such as the measurement of aircrew performance, the classification of applicants, or psychometric evaluations of the predictor measures were also included.

Primary Search. Both computerized and manual searches were conducted. The computerized search utilized the DIALOG system to access the references contained in the Psychological Abstracts and National Technical Information Service databases. A manual search was conducted of the library files of the United States Air Force Human Resources Laboratory and the library of Science-3 (Air), United Kingdom Ministry of Defence. Proceedings of the annual meetings of the Military Testing Association, American Psychological Association, and Human Factors Society were also reviewed. In addition, a manual search of the *Psychological Abstracts* from 1960 forward was conducted.

Secondary Search. The bibliographies and reference lists contained in documents obtained during the primary search were reviewed and relevant references identified. This process was then repeated with each subsequent document obtained until no additional relevant references remained.

RESULTS

The literature search revealed over 200 references dealing directly or indirectly with aircrew selection. For each study that constituted an empirical validation of a selection measure or set of measures, the measures are listed along with the sample size (N) and the validity coefficients obtained. Brief descriptions of most studies are also provided. However, summaries for several studies cited (principally from British sources) could not be provided because the studies remain classified (typically "Management-in-Confidence" or "Restricted") or are otherwise limited in their release. Qualified individuals may request access to those materials by contacting the appropriate agency at the address given in Appendix A.

Using a classification scheme derived from Hunter (1989), all validation studies were categorized based upon the primary type of predictor measures used. The categories were: (1) paper-and-pencil general ability measures; (2) personality, interest and background measures; (3) psychomotor, perceptual, and information processing measures; (4) job-sample or light-plane measures; and, (5) physiological measures. Studies that did not specifically address predictor measures development and validation were separated into four other categories: literature reviews and descriptions; aircrew classification; aircrew performance measurement; and, other relevant studies. Tables giving the studies falling into each of these categories are contained in Appendix B.

Note: A table giving the correlation coefficients significant at the .05 and .01 levels is provided in Appendix C. Therefore, the significance levels of individual correlations are generally not noted in the summaries that follow.

ANNOTATED BIBLIOGRAPHY

1. Alcock, J. (1981). RAAF pilot selection testing: A review. (Research Note 2/81). Canberra, Australia: Department of Defence (Air Force Office) Psychology Service.

   Report describes the historical background and development of the Royal Australian Air Force pilot selection tests and provides data on validity and utility of test procedures.

   (The distribution of this document has been restricted by the releasing agency. No data may be abstracted for public release. Consult the releasing agency for further information.)

2. Alvares, K. M. (1971). The effects of complex skill acquisition on measures of ability. Dissertation Abstracts, 31 (12-B), 7657.

   Describes a study of the temporal decay of predictive validities using eighty students in basic flight training at the University of Illinois. Two models (changing-task and changing-subject) were described which could account for the decay. In addition, a third model which is a combination of the first two is proposed. Data presented support the combination model in which both the task and the subject change over time. Implications of the finding for selection and training are discussed.

3. Ambler, R. K., Bair, J. T., & Wherry, R. J. (1960). Factorial structure and validity of naval aviator selector variables. Aerospace Medicine, 31, 456-461.

   Performed a factor analysis of the seven elements considered in the selection of Navy aviators, obtained from the Aviation Score Sheet. In addition to score sheet data additional data on educational level and scores from the Mechanical Comprehension Test, Spatial Apperception Test, and Biographical Inventory which comprise the Flight Aptitude Rating were also included in the analysis. Five factors were obtained, and four were rotated to simple structure. Two of the five factors were found to correlate significantly with the pass/fail criterion.

   SAMPLE: N = 790 ; United States ; Navy

   CRITERION: Pass/Fail; Training

PREDICTOR	CRITERION CORRELATION
Personality Rating	-.06
Selection Board	.07
Scholastic Standing	.01
Mathematics & Physics	.01
Board Evaluation	-.08

Aviation Qualification Test	.07
Mechanical Comprehension Test	.36
Spatial Apperception Test	.29
Biographical Inventory	.23
Flight Aptitude Rating	.43
Educational Level	-.09
Preflight Ground Grade	.35
Preflight Officer-like Qualities	.26

Factors

I - Flight Ability	-.41
II - Appearance of Maturity	.08
III - Military Conduct	-.21
IV - Motivation to Take Risks	-.09
V - Academic Interest	-.29

4. Ambler, R. K., Johnson, C. W., & Clark, B. (1952). An analysis of biographical inventory and spatial apperception test scores in relation to other selection tests (Special Report 52-5). Pensacola, FL: US Naval School of Aviation Medicine.

Presents an analysis of data which were used in the development of a biographical inventory for naval aviator selection. There is very little explanation of how these data were obtained or analyzed and no discussion of the results beyond an enumeration of the tables.

SAMPLE: N = 372; United States ; Navy

CRITERION: Pass/Fail; Training

PREDICTOR	CRITERION CORRELATION
Biographical Inventory	.75
Mechanical Comprehension Test	.31

5. Ambler, R. K., Rickus, G. M., & Booth, R. F. (1970). Prevention of misassignments among various aviation specialties. Aerospace Medicine, 41, 15-17.

Reports on a study of Naval Flight Officers (non-pilots) and their assignment of advanced training specialties. Data from the initial selection process (test scores) and subsequent schools were used as potential predictors of a dichotomous pass/fail advanced training criterion. Significant multiple correlations were obtained for selected predictors for each of the advanced specialties. Tables which give the probability of completing training for various predictor score levels are provided. The report indicates that a cross validation study was underway but no data on cross validity are presented.

6. Ambler, R. K., & Waters, L. K. (1967). The value of an NROTC flight indoctrination program to Naval aviation training. Pensacola, FL: Naval Aerospace Medical Center.

A study of the flight indoctrination program (FIP) among U. S. Navy ROTC students, produced evidence that such a program reduces attrition in training, (15% attrition for the FIP group -- 30% attrition for the non-FIP group).

7. Army Air Force (1944a). Research program on psychomotor tests in the Army Air Forces. Psychological Bulletin, 41, 307-321.

Provides a brief history and description of the Psychological Research Unit Number 2, located in San Antonio, Texas during World War II. Short descriptions of the psychomotor tests used operationally or evaluated for aircrew selection are given. No validity data are provided.

8. Army Air Force (1944b). The aviation cadet qualifying examination of the Army Air Forces. Psychological Bulletin, 41, 385-394.

Describes the development and content of the Aviation Cadet Qualifying Examination, used as part of the aviator selection process. No validity data are provided.

9. Bache, A. D., Bradshaw, R. G., Cook, L. R., & Hobgood, L. A. (1978). Candidate selection for parallel track undergraduate pilot training (Research Report No. 290). Maxwell Air Force Base, AL: Air War College.

This report examines historical aspects of screening and selection for pilot training and discusses possible pilot candidate selection and assignment procedures associated with a notional parallel track pilot training system. The authors describe procedures for validating a track selection algorithm consisting of various types of predictors. No new data are presented.

10. Bair, J. T., Lockman, R. F., & Martoccia, C. T. (1956). Validity and factor analysis of naval air training predictor and criterion measures. Journal of Applied Psychology, 40, 213-219.

Reports on the evaluation of seven standardized spatial and perceptual ability tests as predictors of performance in US Navy flight training. Scores from existing selection tests and from performance during preflight ground training were also included. Four factors were extracted and rotated to simple structure. Correlation of the factors with the flight performance criteria ranged from .02 to .48.

SAMPLE: N = 108 ; United States ; Navy

CRITERION: Performance Rating; Basic & Advanced Training

PREDICTOR	CRITERION CORRELATION		
	Ground School	Final Basic Flight	Final Advanced Flight
Revised Minnesota Paper Form Board	.25	.24	.24
DAT Space Relations	.35	.17	.10
Guilford-Zimmerman Spatial Orientation	.33	.21	.23
DAT Clerical Speed and Accuracy	.12	.12	.14
Minnesota Clerical-Number Comparison	.31	-.03	.17
Minnesota Clerical-Name Comparison	.52	-.10	.12
Topological Orientation Test	-.42	-.14	-.24
ACE Psychological Examination-L	.62	-.06	.14
ACE Psychological Examination-Q	.53	.09	.20
GED Correctness and Effectiveness of Expression	.58	-.01	.26
Essentials of Mathematics	.66	.15	.23
Aviation Classification Test	.62	-.09	.15
Mechanical Comprehension Test	.45	.22	.22

11. Baisden, A. G. (1980a). A comparison of college background, pipeline assignment, and performance in aviation training for black student naval flight officers and white student naval flight officers (Special Report 80-2). Pensacola, FL: Naval Aerospace Medical Research Laboratory.

    Report examines differences in selection test scores, training grades, complete/attrite data, and college background information between black and white students in naval flight officer (non-pilot) training.

12. Baisden, A. G. (1980b). An examination of black accession and performance in Naval Aviation training. Proceedings of the 22nd Annual Meeting of the Military Testing Association.

    Summarizes the findings of four reports examining differences between black and white student naval flight officers (non-pilots). Overall results indicate that the major problem is not black attrition but failure to attract qualified black applicants.

13. Baisden, A. G., & Doll, R. E. (1978). A comparison of black student performance and white student performance in naval aviation training (Special Report 78-7). Pensacola, FL: Naval Aerospace Medical Research Laboratory.

Analysis of minority officer accessions in the Naval Aviation Training Program. Presents comparisons of black and white students in pilot training using Aviation Selection Tests, peer ratings, officer quality grades, flight and academic grades, and pass/fail rates. N = 99 Black Students; N = 172 White Students. Significant differences were found for seven of eight measures. Attrition rates were virtually identical for the two groups (50.5% for Blacks; 50.6% for Whites).

14. Baisden, A. G., & Doll, R. E. (1979). A comparison of college background, pipeline assignment, and performance in aviation training for black student naval aviators and white student aviators (Special Report 80-1). Pensacola, FL: Naval Aerospace Medical Research Laboratory.

The third in a series of reports which analyzed minority accessions and attrition in the Naval Air Training Program. In this report college major, grade point average, and the racial composition of the college were analyzed for correlation with performance differences. No significant effects were noted.

15. Baisden, A. G., & Doll, R. E. (1980). An examination of black accession and performance in naval aviation training. Pensacola, FL: Naval Aerospace Medical Research Laboratory.

This is a summary of the series of reports examining minority accessions and performance (see also Baisden, 1980). Major problem cited is failure to attract qualified black applicants.

16. Bale, R. M., & Ambler, R. K. (1971). Application of college and flight background questionnaires as supplementary noncognitive measures for use in the selection of student naval aviators. Aerospace Medicine, 42, 1178-1181.

A study of student naval aviators in which a Flight Background Questionnaire and a College Background Questionnaire were administered to a sample of 1,207 students. This sample was split in half and the item responses from one group were used to develop item weights based upon the items' relationships to success/failure in pilot training. In the development sample the the questionnaire items added significantly to the existing selection measure for the prediction of a pass/fail criterion, raising the multiple correlation with pass/fail from 0.221 (aptitude tests alone) to 0.301 (aptitude tests plus questionnaire items). Of the individual items in the questionnaires, only "Has a private license" was

significantly correlated with pass/fail (r = .113) in the initial validation sample. The predictor scores calculated for the cross-validation sample had a point biserial correlation of .193 (p < .001) with the pass/fail criterion.

SAMPLE: N = 602 ; United States ; Navy

CRITERION: Pass/Fail ; Training

PREDICTOR	CRITERION CORRELATION
Aviation Qualification Test	.048
Mechanical Comprehension Test	.177
Spatial Apperception Test	.054
Biographical Inventory	.141

Previous 4 tests used for selection - correlations do not include any correction.

17. Bale, R. M., Rickus, G. M., & Ambler, R. K. (1973). Prediction of advanced level aviation performance criteria from early training and selection variables. Journal of Applied Psychology, 58, 347-350.

Examined the prediction of a pass/fail criterion during training in a replacement air group (post undergraduate pilot training) from selection test scores and grades obtained during primary, basic, and advanced training. A total sample of 592 aviators was divided roughly in half based upon training location. A sample of 374 aviators (assigned to the west coast training site) were used for initial validation, and the sample of 218 aviators who were assigned to the east coast were used for cross-validation. A multiple correlation of .43 (p < .001; corrected for restriction of range) was obtained from 15 measures. The point-biserial correlation for the cross-validation sample was .36 (p < .001).

18. Bale, R. M., & Waldeisen, L. E. (1969). The relationship of the objectively scoreable apperception test (OAT) to success in naval aviation training. Pensacola, FL: Naval Aerospace Medical Center.

The Objectively Scoreable Apperception Test (OAT) is a forced-choice version of the Thematic Apperception Test. The OAT added to existing selection measures in an initial validation sample (N = 349), but the results did not replicate in the cross-validation sample (N = 346).

19. Banich, M. T., Stokes, A., & Elledge, V. C. (1989). Neuropsychological screening of aviators: A review. Aviation, Space, and Environmental Medicine, 60, 361-366.

A battery of tests extracted principally from the military aircrew selection batteries is proposed for use in the screening of aviators by the Federal Aviation Administration. Certain of the abilities assessed by the batteries are described in relation to their capacity to detect underlying neurological and psychiatric disorders. No data are provided.

20. Bartlett, F. C., (1940). Brief summary of the present position of the test and experimental work at Cambridge (Report No. 118). London, England: Flying Personnel Research Committee, Royal Air Force, Ministry of Defence.

A brief status report on research underway to improve pilot selection and classification. It is reported that attempts were underway "...to discriminate between the men who get into their stride at once and those who require a longer 'warming up' period" and "...between the men who do best when they work in short, intensive spurts and those who are better when they have longer periods of concentration." The report indicates that the former are assumed to be "fighter type" and the latter "the bomber type." No data are presented.

21. Bartlett, F. C., & Craik, K. J. (1939). Report on the Reid Machine (Report No. 59). London, England: Flying Personnel Research Committee, Royal Air Force, Ministry of Defence.

Describes the test apparatus and the purpose and method of scoring. Primary measure is total time taken for hand, foot, and combined movements required to operate a stick and rudder in a signal-cancelling task. Comments on the construction of the apparatus and suggestions for improvements in the scoring procedures are provided. No data are presented.

22. Bartram, D. (1986). Development and evaluation of MICROPAT version 4 (Report TR 184). London, England: Senior Psychologist (Naval), Ministry of Defence.

An extensive description of the tests comprising version 4 of the MICROPAT testing system under evaluation by the armed forces of the United Kingdom. Validity data are given for rotary wing aviators and intercorrelation matrices are given for all variables collected from the MICROPAT.

(The distribution of this document has been restricted by the releasing agency. No data may be abstracted for public release. Consult the releasing agency for further information.)

23. Bartram, D. (1988). Validation of MICROPAT version 4. I. The prediction of RN observer and pilot grading outcomes (Report TR 210). London, England: Senior Psychologist (Naval), Ministry of Defence.

Report on the validation of the tests comprising version 4 of the MICROPAT testing system under evaluation by the armed forces of the United Kingdom. Validity data are given for rotary wing aviators and intercorrelation matrices are given for all variables collected from the MICROPAT.

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24. Bartram, D., & Choi, M. (1988). Evaluation of three computer-based tests of navigational ability (Report TR 209). London, England: Senior Psychologist (Naval), Ministry of Defence.

Describes test instruments to assess aspects of navigational ability. Intercorrelations of test measures, reliabilities, and factor analyses are presented. No predictive validity data are provided.

(The distribution of this document has been restricted by the releasing agency. No data may be abstracted for public release. Consult the releasing agency for further information.)

25. Bartram, D., Corkindale, K. G. G., & Dennison, D. (1985). The validity of MICROPAT tests for Army helicopter pilot selection (Report No. 85-R-005). Farnborough, England: Royal Aircraft Establishment, Army Personnel Research Establishment.

26. Bartram, D. & Dale, H. C. A. (1982). The Eysenck Personality Inventory as a selection test for military pilots. Journal of Occupational Psychology, 55, 287-296.

Examined the contribution of the Eysenck Personality Inventory (EPI) to the selection of United Kingdom Army Air Corps pilots. Multiple correlation of existing selection measures (Sensory Motor Apparatus, Control of Velocity Test, and Instrument Comprehension) was 0.40. Addition of four EPI measures increased the multiple correlation to 0.44. The contribution is statistically significant, although the zero order correlations of the EPI measures with the pass/fail criterion were inconsistent.

SAMPLE: N = 248 ; United Kingdom ; Army

CRITERION: Pass/Fail ; Training

PREDICTOR	CRITERION CORRELATION
Sensory Motor Apparatus	.28
Control of Velocity Test	.30
Instrument Comprehension	.24
EPI Neuroticism	-.21
EPI Extraversion	.11
Lie	.03

27. Bartram, D., & Dale, H. C. A., (1983). A description of the fully automated personnel selection testing system being developed for the Army Air Corps. Hull, England: Ergonomics Research Group, University of Hull.

Provides a brief history of the development of the MICROPAT testing system and a description of the hardware and software comprising the system. The tests implemented on the system are described briefly. They are: adaptive tracking; risk-taking behavior, assessment of decision-criterion flexibility; time-sharing ability; landing simulator; scheduling ability; and, memory span. No data are presented.

28. Bartram, D., Dale, H. C. A., & Bayliss, R. (1983). Report on the concurrent validity of the MICROPAT test battery. (Report ERG/Y6536/83/10). Hull, England: Ergonomics Research Group, University of Hull.

A concurrent validity analysis was undertaken using data on 41 student pilots who had taken the MICROPAT battery. Comparisons of test scores of successful and unsuccessful students generally failed to show significant differences. The authors attribute this to a small sample size, and point out the generally positive direction of the differences.

29. Bartram, D., Dale, H. C. A., & Smith, P. (1982). Leconfield trials of the micropat system (Report ERG/Y6536/82/5). Hull, England: Ergonomics Research Group, University of Hull.

Describes the MICROPAT system and its tests as administered to United Kingdom Army personnel during 1981. The tests comprising this version of the MICROPAT were: tracking; schedule; Eysenck Personality Inventory; landing; signal; risk; digitspan; and, dual task. Descriptions of the tests are given along with intercorrelations and results from factor analyses. Correlations between the test battery measures and a pass/fail criterion for a sample of 45 truck driver trainees are given.

30. Baxter, T. D. (1978). Predicting undergraduate pilot training (UPT) performance for Air Force Academy graduates (SRL-TR-78-0004). United States Air Force Academy, CO: Frank J. Seiler Research Laboratory.

This study examined the correlations between Undergraduate Pilot Training criteria and measures taken from light-plane training and academic performance for a sample of 448 US Air Force Academy graduates. No significant relationships were observed.

31. Belgian Air Force (1983). Pilot selection in the Belgian Air Force. Brussels, Belgium: Air Staff - VSI/N, Aeronautical Medical Center.

This document describes the current pilot selection system used by the Belgian Air Force and proposed modifications to improve the system. Some operational and experimental tests are described and data are provided on validity.

(The distribution of this document has been restricted by the releasing agency. No data may be abstracted for public release. Consult the releasing agency for further information.)

32. Berkshire, J. R. (1967). Evaluation of several experimental aviation selection tests. Pensacola, FL: Naval Aerospace Medical Center.

Based upon a review of the flight records of pilot trainees who had high stanine scores but who subsequently failed in pilot training, three tests were developed and evaluated. In addition, validity coefficients are reported for a variety of measures for two samples, Aviation Officer Candidates (with college degrees) and Cadets (with two years of college).

SAMPLE: N = 400 (approx.) ; United States ; Navy

CRITERION: Pass/Fail ; Basic Training

PREDICTOR	CRITERION CORRELATION
Altitude Judgement (N = 558)	.161
Maneuvers Test (N = 347)	.169
Instrument Comprehension (N = 396)	.140

(Preceding were initial validation samples, independent of the following)

CRITERION: Pass/Fail ; Training

PREDICTOR	CRITERION CORRELATION Sample A AOC (N=407)	Sample B Cadets (N=379)
Age	-.002	-.080
Education	-.054	-.092
Aviation Qualification Test	.081	-.017
Mechanical Comprehension Test	.244	.187
Spatial Apperception Test	.000	.098
Background Inventory	.103	.179
Mathematics	.124	.057
Background	-.025	-.068
Altitude Judgement	.083	.006
Instrument Comprehension	.159	.092
Prestige Score	.038	-.009
Prestige Difference	.137	-.029
Security Score	.038	.121
Security Difference	.008	.063

33. Berkshire, J. R., & Ambler, R. K. (1963). The value of indoctrination flights in the screening and training of Naval aviators. Aerospace Medicine, 34, 420-423.

Measures were collected on a sample of students sent through a one-week flight indoctrination phase prior to entry into the pre-flight phase of Naval aviation training. Students received four flight totaling 5.9 hours of flight time.

SAMPLE: N = 196 ; United States ; Navy

CRITERION: Performance Scores ; Training

CRITERION CORRELATION & PREDICTORS

	Aviation Qualification Test	Flight Aptitude Rating	Instructor Prediction Form	Indoc. Flight Grade
Pre-Flight Grade	.509	.223	.234	.218
Primary Flight Grade	.121	.395	.487	.543
Final Over-All Grade	.353	.345	.370	.360
Pass vs. Flight Fail	.142	.205	.277	.377
Pass vs. Ground Fail	.263	.052	.143	.161
Pass vs. Voluntary Withdrawal	.179	.418	.304	.125
Pass vs. Other Fail	.040	.145	.560	.390
Pass vs. Total Fail	.152	.229	.355	.337

34. Berkshire, J. R., & Ambler, R. K. (1969). New technologies in aviation selection testing. Proceedings of the XVIth International Congress of Applied Psychology. Amsterdam, Holland: 558-564.

Describes research efforts to improve pilot selection for the U.S. Navy. Measures which are described include: secondary screening using grades obtained during flight training; a vestibular disorientation test; several film tests involving information processing ability; and, some work on automated test construction. No data are presented.

35. Bickley, W. R., Brown, W. R., Dohme, J. A., & McCracken, J. H. (1981). Aviator-aircraft integration: ARI research in Army Aviation. Paper presented at the Psychology in the Department of Defense Conference, United States Air Force Academy, CO.

Describes research in progress to improve pilot selection for the U.S. Army. A general description of the results from implementation of the Flight Aptitude Selection Test (FAST) is given which indicates the FAST is an effective screening instrument. No data are presented.

36. Booth, R. F., & Peterson, F. E. (1968). Expansion of the Naval flight officer student prediction system (NAMI-1038). Pensacola FL: Naval Aerospace Medical Center.

An examination of the feasiblilty of using the student prediction system developed for Aviation Officer Candidates (pilots) for Naval Flight Officers (non-pilots). The prediction system uses initial selection test scores along with measures taken from training to generate predictions of the overall criterion (pass/fail) continuously during the training process.

SAMPLE: N = 1,150 ; United States ; Navy Flight Officers (Non-pilots)
CRITERION: Pass/Fail ; Training

PREDICTOR	CRITERION CORRELATION
Aviation Qualification Test	.15
Mechanical Comprehension	.14
Spatial Apperception	.09
Biographical Inventory	.02
Aerodynamics	.18
Navigation	.21
Power Plants	.18
Physiology	.15
Physical Training	.11

37. Bordelon, V. P., & Kantor, J. E. (1986) Utilization of psychomotor screening for USAF pilot candidates: Independent and integrated selection methodologies (AFHRL-TR-86-4). Brooks Air Force Base, TX: Manpower and Personnel Division, Air Force Human Resources Laboratory.

Describes research conducted from 1978 to 1985 to develop and validate two tests of psychomotor coordination. Presents the cumulative data from preceding studies and offers three models which incorporate psychomotor test scores for the prediction of training success for different accession groups. Zero order correlations and multiple correlations are provided. (If used in meta analysis, caution should be taken since many of these data are presented in earlier, independent studies.)

SAMPLE: N = 1,500 to 8,000 ; United States ; Air Force

CRITERION: Pass/Fail ; Training

PREDICTOR	CRITERION CORRELATION
Flight Screening Program Pass/Fail (N=1534)	.137
Flight Screening Program Final Grade (N=1534)	.271
Air Force Officer Qualifying Test	
Pilot Score (N = 4460)	.158
Navigator/Technical Score (N=460)	.148
Academic Score (N = 4577)	.080
Verbal Score (N = 4576)	.007
Quantitative Score (N = 4577)	.138
Two Hand Coordination Test (X-Axis) (N=1918)	-.118
Two Hand Coordination Test (Y-Axis) (N=1918)	-.099
Complex Coordination Test (X-Axis) (N=1906)	-.153
Complex Coordination Test (Y-Axis) (N=1910)	-.181
Complex Coordination Test (Z-Axis) (N=1916)	-.146
Age (N = 8438)	-.120
Gender (N = 8438)	.033
Race (N = 8292)	.110
Possession of Technical Degree (N = 8183)	.111

38. Bortner, D. E., & Ree, M. J. (1977). Cost analysis of pilot selection systems (AFHRL-TR-77-55). Brooks Air Force Base, TX: Personnel Research Division, Air Force Human Resources Laboratory.

Utilized a life cycle costing approach to evaluate seven possible pilot selection systems consisting of written, psychomotor, and simulator test scores. The primary determinant of system costs was found to be temporary duty (TDY) costs of transportation, lodging, and meals.

39. Boyle, D. J., & Hogin, W. V. (1953). The light plane as a pre-primary selection and training device: I. analysis of operational data (Technical Report 53-33). Goodfellow Air Force Base, TX: Human Resources Research Center.

Described the results of a study in which 120 students were given 25 hours of light-plane training prior to entering pilot training, and matched against a sample of 120 control students who received no such training. Of the 120 students who received the training, 87% graduated, and there were only 4 accidents. This was compared to the control group, in which 62% graduated, while experiencing 11 accidents.

40. Brictson, C. A., Burger, W. J., & Gallagher, T. (1972). Prediction of pilot performance during initial carrier landing qualification. Aerospace Medicine, 43, 483-487.

Examined the prediction of post-training criteria (aircraft carrier landing qualification measures) from selection tests, basic and advanced flight training grades, and replacement air group scores. A multiple correlation of .72 ($p < .01$) was obtained using all measures to predict night landing performance. Selection tests alone generated a multiple correlation of .24 ($p < .05$) with that criterion. Multiple correlations for other criteria and an intercorrelation matrix of all measures are given.

41. Brown, W. R., Dohme, J. A., & Sanders, M. G. (1981). Changes in the U. S. Army aviator selection and training program. In, R. W. S. Jensen (Ed.), Proceedings of the First Symposium on Aviation Psychology (Technical Report APL-1-81). Columbus, OH: Aviation Psychology Laboratory of the Ohio State University.

Reported on the development of a Revised Flight Aptitude Selection Test (RFAST). Development of this revised battery was brought about because of changes in the mission of the Army aviator and because of difficulties (primarily administrative) in the FAST battery itself. Whereas the FAST battery had two versions, one for Warrant Officers and one for Commissioned Officers, the new RFAST had but a single version, and had been reduced in length from the original twelve tests in the FAST to seven tests. The tests comprising the RFAST are: Biographical Information; Mechanical Principles; Helicopter Information; Instrument Comprehension; Complex Movements; and, Stick and Rudder Orientation. The study reported a corrected validity coefficient of .33 for the RFAST, based upon a sample of 178 Warrant Officer Candidates.

42. Bucky, S. F., & Spielberger, C. D. (1973). State and trait anxiety in voluntary withdrawal of student naval aviators from flight training. Psychological Reports, 33, 351-354.

In a study of 316 student naval aviators, it was found that those who were more anxious, as measured by the State-Trait Anxiety Inventory, were more likely to drop out of training, and that the more anxious the student, the earlier the student dropped. Means and standard deviation of the various comparison groups are provided.

43. Burke, E. F. (1980). Results of a preliminary study on a new tracking test for pilot selection (Note No. 9/80). London, England: Science 3 (Royal Air Force), Ministry of Defence.

Describes the validation of a time-on-target score obtained from a tracking task utilizing both pursuit and compensatory tracking and varying levels of difficulty. Results of an earlier study with 11 subjects are summarized and intercorrelations of all measures are provided.

SAMPLE: N = 40 ; United Kingdom ; Royal Air Force

CRITERION: Pass/Fail ; Initial Basic Flying Training

PREDICTOR	CRITERION CORRELATION
Time-On-Target	.06
Control of Velocity Test	.13
Sensory Motor Apparatus	-.02
Pre-Entry Flying Expêrience	.00
Educational Qualifications	.00
Age	.04
Pilot Index (written selection tests)	.-04

(Correlations corrected for restriction of range)

44. Burke, E. F. (1983). Computer based aptitude tests for navigators: Initial results (CS(RAF) Note for the Record 18/83). London, England: Science-3 (Royal Air Force), Ministry of Defence.

Presents the results of interviews with navigator instructors and application of an ability identification procedures (Fleishman Algorithm). This report identifies cognitive, perceptual, physical, and psychomotor abilities required for successful completion of navigator training. Results are applicable to specification of a computer based battery for navigator selection.

45. Burke, E. F. (1987). Current trends in pilot selection research: Introduction and examples from current RAF research. Ottawa, Canada: Proceedings of the Military Testing Association.

Brief review of current efforts to improve pilot selection in the Royal Air Force. No data are presented.

46. Burke, E. F. (1990). Development and validation of Royal Air Force computer-based selection tests. Washington, D.C.: NATO Research Study Group 15.

This paper describes the recent history of test development and transition from electromechanical test devices to computer-based tests at the Officer and Aircrew Selection Centre. A listing of the current tests, the abilities assessed and their usage is provided; however, no validity data are given.

47. Burwell, R. R. (1957). Historical review of aircrew selection (Report No. 1-58). Randolph Air Force Base, TX: United States Air Force School of Aviation Medicine.

48. Carretta, T. R. (1986). Spatial ability as a predictor of flight training performance (AFHRL-TP-86-70). Brooks Air Force Base, TX: Manpower and Personnel Division, Air Force Human Resources Laboratory.

Examined the degree to which scores from a mental rotation task were predictive of flying training pass/fail and advanced training recommendations. The mental rotation task required subjects to make same/different responses to pairs of letters presented on a CRT. Angular difference between the letters of a pair were varied in both the same and different condition. A low and nonsignificant correlation ($r = -.034$, $N=526$) was found between the mental rotation task score (mean reaction time) and the pass/fail criterion. A significant correlation ($r = .120$) was found between the same score and the advanced training recommendation criterion. Correlations three scores from the mental rotation task with various flying performance criteria are presented.

49. Carretta, T. R. (1987a). Basic attributes tests (BAT) system: Development of an automated test battery for pilot selection (AFHRL-TR-87-9). Brooks Air Force Base, TX: Manpower and Personnel Division, Air Force Human Resources Laboratory.

Describes the events leading to the development of the Basic Attributes Tests (BAT) system and its hardware and software specifications. Early implementations of the prototype BAT systems were quickly supplanted with a portable version (PORTA-BAT), utilizing a super-microcomputer processor and high-speed graphics. Software development and quality

control measures are described. Fifteen tests comprising the test battery are described. Initial efforts at validation are briefly mentioned; however no validity data are provided.

50. Carretta, T. R. (1987b). The Basic Attributes Tests: An experimental selection and classification instrument for U.S. Air Force pilot candidates. In R.S. Jensen (Ed.), Proceedings of the Fourth International Symposium on Aviation Psychology. Ohio State University: Aviation Psychology Laboratory.

Describes the tests comprising the Basic Attributes Tests (BAT) battery. In addition to correlation with pass/fail criterion, correlations with other performance measures taken from pilot training are given.

SAMPLE: N = 433 ; United States ; Air Force

CRITERION: Pass/Fail ; Training

PREDICTOR	CRITERION CORRELATION
AFOQT Pilot Composite	.064
Complex Coordination Test	.257
Dot Estimation	.073
Digit Memory	.090
Encoding Speed	.202
Mental Rotation	.148
Item Recognition	.187
Risk Taking	.121
Embedded Figures	.063
Time Sharing	.138
Word Knowledge	.174
Activities Interest Inventory	.137

51. Carretta, T. R. (1987c). Field dependence-independence and its relationship to flight training performance (AFHRL-TP-87-36). Brooks Air Force Base, TX: Manpower and Personnel Division, Air Force Human Resources Laboratory.

Evaluated the utility of the Embedded Figure Test as a predictor of pilot training performance. A computerized version of the test was administered to 1,977 pilot candidates prior to entry into pilot training. For a sample of 601 for whom training criterion data was available, the test demonstrated poor predictive validity against all criteria. The multiple correlation between training pass/fail and an Embedded figures Test model containing average response time, percent correct, and response time-percent correct interaction, was .046 (n.s.).

52. Carretta, T. R. (1987d). Relationship of encoding speed and memory tests to flight training performance (AFHRL-TP-87-49). Brooks Air Force Base, TX: Manpower and Personnel Division, Air Force Human Resources Laboratory.

Two tests, Encoding Speed and Immediate/Delayed Memory, were administered to 2,219 pilot candidates prior to entry into pilot training. The Encoding Speed test required subjects to make a same-different judgement about letter pairs, based upon one of three decision rules: Physical identity (AA vs Aa); name identity (AA vs AE); and, category identify (vowels versus consonants - AE vs AH). In the immediate/delayed memory task subjects were presented with a sequence of digits and required to respond by indicating the digit that had occurred either one or two digits previously. Correlations with the training criteria were low and generally nonsignificant, although the Encoding Speed test was significantly correlated with an advanced training recommendation criterion.

SAMPLE: N = 545 ; United States ; Air Force

CRITERION: Pass/Fail ; Training

PREDICTOR	CRITERION CORRELATION
Encoding Speed	
Average Response Time	.081
Percent Correct	-.025
Interaction (RT x % Correct)	-.001
Immediate/Delayed Memory	
Average Response Time	-.095 to .060
Percent Correct	-.018 to .059
Interaction (RT x % Correct)	-.064 to .172

53. Carretta, T. R. (1987e). Timesharing ability as a predictor of flight training performance (AFHRL-TP-86-69). Brooks Air Force Base, TX: Manpower and Personnel Division, Air Force Human Resources Laboratory.

Describes the results of a compensatory tracking and signal detection dual-task administered to 1,130 United States Air Force pilot training candidates. Pilot training outcome data were available for 212 candidates. No significant correlations were obtained for prediction of pass/fail.

SAMPLE: N = 212 ; United States ; Air Force

CRITERION: Pass/Fail ; Training

PREDICTOR	CRITERION CORRELATION
Slope of Tracking Task	-.123
Intercept of Tracking Task	.163
Average Difficulty of Tracking Task (Trials 11-19)	.125
Average Reaction Time (Trials 11-19)	-.056

54. Carretta, T. R. (1988). Cross-validation of an experimental pilot selection and classification battery. Proceedings of the 1988 Meeting of the Military Testing Association. Washington, DC:

Developed regression equations for the prediction of two training criteria (pass/fail and advanced training recommendation) from scores from the Air Force Officer Qualifying Test (AFOQT) and the Basic Abilities Tests (BAT) battery. A sample of 709 pilot candidates was tested prior to entry into pilot training. The sample was split to form matched halves (based upon the training criteria) and separate regression equations were developed and then cross-applied for both halves. A combination of 12 AFOQT and BAT scores produced multiple correlations of .303 and .342 with the pass/fail criterion for the two groups. Cross-application of the regression weights resulted in shrinkage to .176 and .220 for the respective groups. All correlations were statistically significant ($p < .01$). Similar results were obtained for prediction of the training recommendation criterion. Zero order correlations of the measures with the criteria are not given.

55. Carretta, T. R. (1989a). Comparison of training performance criteria for USAF pilot selection and classification. In R. S. Jensen (Ed.), Proceedings of the Ohio State University Symposium on Aviation Psychology. Columbus, OH:

Examines alternative methods to the dichotomous pass/fail criterion for characterizing training performance. Three alternative metrics were considered: Air Training Command Class Standing (ATCCS, which includes only graduates); ATCCS with all eliminees scored as five percentage points below passing (i.e., all eliminees receive 65, graduates range from 70 to 100); and, ATCCS with eliminees scored on the basis of flying hours completed (more hours = higher standing). Test scores from the Air Force Officer Qualifying Test (AFOQT) and the Basic Attributes Tests (BAT) battery were included to generate multiple regression equations for the prediction of each of these three matrices for a sample of 245 pilot trainees (179 graduates and 66 failures). Correlation of the rank orderings for these three equations showed that the three metrics were very closely related ($r = .94$ to $.98$). On the basis of these data there was to reason to prefer the continuous

performance metrics over the traditional dichotomous criterion.

56. Carretta, T. R. (1989b). USAF pilot selection and classification systems. Aviation, Space, and Environmental Medicine, 60, 46-49.

Administered the Basic Attributes Test (BAT) battery to a sample of 478 pilot candidates prior to entry into pilot training. Constructed multiple correlation models for the prediction of a pass/fail and an advanced training recommendation criteria from the BAT tests and from scores from the Air Force Officer Qualifying Test (AFOQT). Multiple correlations for set of scores from the individual tests ranged from .062 to .256 for the pass/fail criterion, with similar results for the training recommendation criterion. Combined models which included all 42 available scores resulted in multiple correlations of .498 and .435 with the pass/fail and training recommendation criteria, respectively. Strategies for utilizing these tests in a sequential screening process are discussed. Zero-order correlations of the tests and criteria are not given.

57. Carretta, T. R., & Siem, F. M. (1988). Personality, attitudes, and pilot training performance: Final analysis (AFHRL-TP-88-23). Brooks Air Force Base, TX: Manpower and Personnel Division, Air Force Human Resources Laboratory.

Administered five personality and attitudinal tests to pilot candidates prior to entry into training. Analyzed the contribution of these tests independently, and in combination with the Air Force Officer Qualifying Test (AFOQT) for the prediction of two training criteria: pass/fail and advanced training recommendation. Reports the zero order correlations between the criteria and the experimental tests and the AFOQT subtests. Only the Self-crediting Work Knowledge test had a significant correlation (r = .141) with the pass/fail criterion.

SAMPLE: N = 812 ; United States ; Air Force

CRITERION: Pass/Fail ; Training

PREDICTOR	CRITERION CORRELATION
AFOQT Subtest	
Verbal Analogies	-.044
Arithmetic Reasoning	.053
Reading Comprehension	-.059
Data Interpretation	.031
Word Knowledge	-.088
Math Knowledge	-.026
Mechanical Comprehension	.024
Electrical Maze	.011
Scale Reading	.031

Instrument Comprehension	.218
Block Counting	.075
Table Reading	.057
Aviation Information	.173
Rotated Blocks	.102
General Science	.002
Hidden Figures	.027
Dot Estimation	
Number of Trials Completed	-.015
Number of Correct Responses	-.005
Percent Correct	.025
Total Time	.012
Average Response Time (Correct)	.020
Risk-Taking	
Number of Boxes Chosen (risk)	-.053
Number of Boxes Chosen (no risk)	-.029
Average Response Time (risk)	-.029
Average Response Time (no risk)	-.023
Self-Crediting Word Knowledge	
Average Response Time (Correct)	.141
Percent Correct	-.074
Bet	-.063
Interaction (Response Time X % Correct)	.029
Activities Interest Inventory	
Number of High-Risk Activities	-.020
Average Response Time	-.036
Embedded Figures	
Average Response Time	-.005
Percent Correct	-.046
Interaction (Response Time X % Correct)	-.016

58. Cassie, A. (1956). The relationship between selection and training of RAF cadets (Memo No. 62). London, England: Science 4 (Royal Air Force), Ministry of Defence.

(The distribution of this document has been restricted by the releasing agency. No data may be abstracted for public release. Consult the releasing agency for further information.)

59. Cassie, A. (1960). The validity of the aircrew aptitude tests (Memo No. 91). London, England: Science 4 (Royal Air Force), Ministry of Defence.

(The distribution of this document has been restricted by the releasing agency. No data may be abstracted for public

release. Consult the releasing agency for further information.)

60. Cassie, A. (1962a). Constancy and change in pilot aptitude. In F. A. Geldard (Ed.), Defence Psychology. New York: Pergamon Press.

Summarizes trends in pilot selection since World War II and discusses reasons for the observed variation in predictive validities of selection measures.

61. Cassie, A. (1962b). The three/five aircrew selection scale (Memo No. 116). London, England: Science 4 (Royal Air Force), Ministry of Defence.

(The distribution of this document has been restricted by the releasing agency. No data may be abstracted for public release. Consult the releasing agency for further information.)

62. Cassie, A. (1964). A follow-up and revaluation of the three/five aircrew selection scale (Memo No. 131). London, England: Science 4 (Royal Air Force), Ministry of Defence.

(The distribution of this document has been restricted by the releasing agency. No data may be abstracted for public release. Consult the releasing agency for further information.)

63. Cassie, A. (1967). The three/five aircrew selection scale: 1966 revaluation (Memo Cassie, A. Relationship between aircrew selection predictors and quality at the end of training (Memo No. 153)). London, England: Science 4 (Royal Air Force), Ministry of Defence.

(The distribution of this document has been restricted by the releasing agency. No data may be abstracted for public release. Consult the releasing agency for further information.)

64. Cassie, A., & Anderson, J. D. (1966). The ACF Test: A new test for pilot aptitude (Memo No. 147). London, England: Science 4 (Royal Air Force) Ministry of Defence.

(The distribution of this document has been restricted by the releasing agency. No data may be abstracted for public release. Consult the releasing agency for further information.)

65. Chidester, T. R. (1987). Selection for optimal crew performance: relative impact of selection and training. In R. S. Jensen (Ed), Proceedings of the Fourth International Symposium on Aviation Psychology (April 1987). Ohio State University: Aviation Psychology Laboratory.

Discusses relative and combined contributions of personnel selection and training on crew performance, particularly cockpit resource management. Examples given for airline and U.S. Army pilots. No validity data are given.

66. Cox, J. A., & Mullins, C. J. (1959). Evaluation of light plane training among AFROTC student officers (WADD-TN-59-43). Lackland Air Force Base, TX: Personnel Laboratory, Wright Air Development Center.

This study evaluated an experimental flying program for Reserve Officer Training Corps (ROTC) university students. While the study was not concerned with using the flying program as a selection device it demonstrated that those students who received the flying program before entry into training had a significantly lower failure rate (14% as compared to 21% for those students who did not receive the training).

67. Cox, R. H. (1988). Utilization of psychomotor screening for USAF pilot candidates: Enhancing predictive validity. Aviation, Space, and Environmental Medicine, 59, 640-645.

An examination of alternative scoring procedures for the Complex Coordination Test and Two-Hand Coordination Test. Found that scores from all 10 trials of the tests should be used, rather than only those scores from the last 4 trials (the prevailing practice).

SAMPLE: N = 320; United States ; Air Force

CRITERION: Pass/Fail ; Training

PREDICTOR	CRITERION CORRELATION
Two-Hand Coordination Test	
X-Axis (Average of 10 trials)	-.017
Y-Axis (Average of 10 trials)	-.203
Complex Coordination Test	
X-Axis (Average of 10 trials)	-.205
Y-Axis (Average of 10 trials)	-.255
Z-Axis (Average of 10 trials)	-.160

68. Croll, P. R., Mullins, C. J., & Weeks, J. L. (1973). Validation of the cross-cultural aircrew aptitude battery on a Vietnamese pilot trainee sample (AFHRL-TR-73-30). Brooks Air Force Base, TX: Personnel Research Division, Air Force Human Resources Laboratory.

Presents the validation of the Cross-Cultural Aircrew Aptitude Battery (CCAAB). Correlations with a pass/fail criterion for two samples (A--all pilot trainees; B--rotary-wing trainees only) are presented. Brief

descriptions of the tests comprising the battery are included.

SAMPLE: N = 244 (A), 161 (B); Vietnam ; Air Force

CRITERION: Pass/Fail ; Training

PREDICTOR	CRITERION CORRELATION Sample A	Sample B
Subtraction	.14	.16
Tools	.11	.05
Patterns	.21	.24
Plane Figures	.17	.17
Number Series	.16	.17
Division	.04	.06
Wheels	.30	.25
Designs	.17	.12
Figure Analogies	.23	.22
Number Reversal	.11	.10
Table Reading	.19	.20
Dial Reading	.25	.31
Number Size	.11	.12
Paired Letters	.16	.18
Dot Estimation (I)	.04	.04
Dot Estimation (II)	.02	.02
Maze	.20	.19
Precision Counting	.10	.19
Large Tapping	.09	.06
Small Tapping	.07	.05
Trace Tapping (I)	.05	.05
Trace Tapping (II)	.29	.30
Crossing	.14	.14
Line Control	.24	.26
Tracing	-.01	.03
Signal Reaction	.19	.22

69. Damos, D. L. (1978). Residual attention as a predictor of pilot performance. Human Factors, 20, 435-440.

A small sample study in which performance on a one-dimensional tracking task (primary) and a choice reaction time task (secondary) were compared with performance on flight check rides given after 10, 20, and 30 hours of instruction. Residual attention was measured in terms of median response time to the secondary task. The correlation given below is between that measure and performance on the 30-hour check ride.

SAMPLE: N = 16 ; United States ; Civilian

CRITERION: Flight Check Grade ; Training

PREDICTOR	CRITERION CORRELATION
Residual Attention	.68

70. Damos, D. L., & Lintern, G. (1979). A comparison of single- and dual-task measures to predict pilot performance (Technical Report Eng Psy-79/2). Urbana-Champaign, IL: University of Illinois at Urbana-Champaign.

Study compared the predictive validity of single- versus dual-task measures. Subjects performed two, identical one-dimensional tracking tasks either singly or concurrently. The scores were correlated with performance measures taken from a flight simulator. An initial pattern of decreasing validity over time for the single-task measures was noted, compared to an increasing validity for the dual-task measures. Possible explanations for the unexpected rise in validity for the late single-task measures are discussed.

SAMPLE: N = 57 ; United States ; Civilian

CRITERION: Simulator Performance Score ; Training

PREDICTOR	CRITERION CORRELATION
Single-Task	
Trial 1	.194
Trial 2	.103
Trial 3	.059
Trial 4	-.012
Trial 30	.214
Trial 31	.284
Dual-Task	
Trials 5-9 (Avg.)	.139
Trials 10-14	.204
Trials 15-19	.206
Trials 20-24	.271
Trials 25-29	.287

71. Davis, R. A. (1989). Personality: Its use in selecting candidates for US Air Force undergraduate pilot training (Research Report No. AU-ARI-88-8). Maxwell Air Force Base, AL: Air University Press.

Mailed a questionnaire to 1,648 undergraduate pilot training attendees. The questionnaire contained scales from the Extended Personality Attributes Questionnaire (EPAQ), Work and Family Orientation (WOFO) questionnaire, Myers-Briggs Type Inventory (MBTI), and the Reid-Ware Locus of Control (LOC). A response rate of approximately 47% was obtained. Scores from the 15 personality scales assessed by the

questionnaire were correlated with training success/failure. Suggestions for additional research are given.

SAMPLE: N = 666 ; United States ; Air Force

CRITERION: Pass/Fail; Training

PREDICTOR	CRITERION CORRELATION
EPAQ	
Assertiveness	.13
Interpersonal Orientation	-.06
Aggressiveness	.07
Hostility	.06
Verbal Aggressiveness	-.02
Submissiveness	-.07
WOFO	
Mastery Motivation	-.06
Work Motivation	-.02
Competitiveness	.06
LOC	
Self-Control	-.01
Fatalism	-.05
MBTI	
Extroversion/Introversion	.10
Sensing/Intuition	-.11
Thinking/Feeling	-.01
Judging/Perceiving	.01

72. DeMaio, J. C. (1983). Velocity control decision-making ability: relationship to flying capability and experience (AFHRL-TP-83-32). Williams Air Force Base, AZ: Operations Training Division, Air Force Human Resources Laboratory.

Assessed the relationship between measures taken from a Flight Decision-Making Assessment Task and measures of flying experience and capability. Decision-making measures were found to be reliably related to capability. Individual differences in decision making ability could prove useful as pilot selection measures, although this aspect is not discussed by the author.

73. DeVries, P. B., Yakimo, R., Curtin, J. G., & McKenzie, J. F. (1975). Undergraduate navigator training attrition study (AFHRL-TR-75-62). Williams Air Force Base, AZ: Flying Training Division, Air Force Human Resources Laboratory.

Longitudinal and cross-sectional data were collected from navigator training classes. Data consisted of interviews, test battery scores, and record information. Data were analyzed to identify factors contributing to training

attrition. Regression analyses are given for prediction of various categories of attrition.

74. DeWet, D. R. (1963). The roundabout: a rotary pursuit-test, and its investigation on prospective air-pilots. Psychologia Africana, 10, 48-62.

Describes a pursuit tracking task and the correlations between a time-on-target score and success/failure in pilot training.

SAMPLE: N = 47 ; South Africa ; Air Force

CRITERION: Pass/Fail ; Training

PREDICTOR	CRITERION CORRELATION
Roundabout rotary pursuit tracking	.35

75. Dockeray, F. C., & Isaacs, S. (1921). Psychological research in aviation in Italy, France, England, and the American Expeditionary Forces. Journal of Comparative Psychology, 1, 115-148.

A description of research conducted during and prior to World War I. Authors report the first extensive research program directed toward pilot selection took place in Italy. Among the several measures examined by Italian psychologists prior to and during the war were measures of reaction time, emotional reaction, equilibrium, perception of muscular effort, and attention. While most of these tests were apparatus-based, the attention test used a paper-and-pencil format. In concluding their review of research conducted by Italy, France, England, and the American Expeditionary Forces, they noted that while no general rule could be specified,

> "Quiet, methodical men were among the best flyers. What seems most needed by the aviator is intelligence,that is the power of quick adjustment to a new situation and good judgement. He need not be so quick in motor adjustments, provided he thinks clearly or makes quick mental adjustments."

76. Dohme, J. A. (1979). Assignment of Army aviator trainees to undergraduate aeroscout mission training. Proceedings of the 21st Annual Meeting of the Military Testing Association.

Describes the development of an algorithm to assign student aviators to one of two training tracks (normal training versus scout training). Questionnaire data obtained from experienced aviators were used to determine weightings for measures such as Map Reading, Leadership Abilities, Aggressiveness, etc. The algorithm score was validated

against overall pilot training grade (r = .27) and an aeroscout tactics grade (r = .39) for a sample of 248 students.

77. Dohme, J. A., Brown, W. R., & Sanders, M. G. (1982). Army aviator selection research: then and now (Unpublished paper). Fort Rucker, AL: U. S. Army Research Institute Field Unit.

A review of Army aviator selection research, beginning with World War II. Describes the Army Flight Aptitude Selection Test (FAST) and its revision (RFAST). Some graphic data and summaries of research results are given. No validity coefficients are reported.

78. Dohme, J. A., & Sanders, M. G. (1979). Validation of the aeroscout selection process (Report FR/FU-79-4). Fort Rucker, AL: U. S. Army Research Institute.

A more extensive description of the study cited above as Dohme (1979).

79. Dolgin, D. L., & Gibb, G. D. (1988). A review of personality measurement in aircrew selection (NAMRL Monograph 36). Pensacola, FL: Naval Aerospace Medical Research Laboratory.

Reviewed the literature on the use of personality measures for the selection of individuals for pilot training. Descriptions of the principal instruments evaluated along with the outcomes are provided. The use of behavior oriented, as opposed to inventory type assessments is proposed, based upon the limited success obtained for the latter types of instruments. The reference list includes 121 citations.

80. Dolgin, D. L., Shull, R. N., & Gibb, G. D. (1987). Risk assessment and the prediction of student pilot performance. In R.S. Jensen (Ed.), Proceedings of the Fourth International Symposium on Aviation Psychology. Ohio State University: Aviation Psychology Laboratory.

Initial validation of a test which assessed risk-taking tendencies. Risk taking was assessed by a multi-trial gambling task. Correlations between six risk-taking scores and pass/fail for a small sample (N = 15) ranged from -.188 to .498.

81. Doll, R. E. (1962). Officer peer ratings as a predictor of failure to complete flight training (Special Report 62-2). Pensacola, FL: U. S. Naval Aviation Medical Center.

Investigated the predictive validity of peer ratings for samples of 606 officer students and 666 cadets during pre-flight training. Cadet peer ratings contributed

significantly to the multiple validity for prediction of training success; however the officer peer ratings did not. Bi-serial correlations of the peer ratings with pass/fail were .20 and .36 for the officer and cadet samples, respectively.

82. Doll, R. E., & Baisden, A. G. (1979). A comparison of black civilian procured applicants and white civilian procured applicants for naval aviation training CY 1976 - 1978 (Special Report 79-3). Pensacola, FL: Naval Aerospace Medical Research Laboratory.

Comparison of black and white applicants for naval aviation training in terms of passing rates for different cutting scores of the Academic Qualification Test and the Flight Aptitude Rating. Analysis of differences between recruiting areas and college majors are given. Recommendations are made for black recruiting program. No validity data are given.

83. Dudek, F. J. (1949). The dependence of factorial composition of aptitude tests upon population difference among pilot trainees. II. The factorial composition of test and criterion variables. Educational & Psychological Measurement, 9, 95-104.

Reports results of factor analyses of the test batteries used for pilot selection. Also gives factorial composition of the pilot criterion in terms of previously identified factors.

84. Eastman, R. F., & Leger, M. (1978). Validity of associate ratings of performance potential by Army aviators. Proceedings of the 20th Annual Meeting of the Military Testing Association.

Report of a project to develop measures to identify outstanding combat performers. Study evaluated the validity of candidate evaluation forms (peer ratings) as predictors of trainee performance in an attach helicopter (AH-1) transition course. For a sample of 45 rated aviators, the peer ratings correlated .32 with flight transition grades and .21 with aerial gunnery grades. Reference includes a copy of the evaluation form.

85. Eastman, R. F., Leger, M., & Shipley, B. D. (1977). Analysis of questionnaire data to identify "ace" attack helicopter pilots. Proceeding of the 19th Annual Meeting of the Military Testing Association.

Describes the results of a survey of helicopter pilots with attack helicopter combat experience who had received an award for valor. A sample of 280 officers was matched against a control group of 385 officers who had served in Vietnam during a corresponding period, but who were not

attack helicopter pilots and had not been decorated for valor. The survey included assessments of military background, background and activities inventory, an aviator attitude questionnaire, and a self-description form. Certain of the survey items were found to be individually associated with group membership. A discriminant function analysis achieved 69.9% correct classification, using all data. No cross-validation data are given.

86. Eastman, R. F., & McMullen, R. L. (1976). Reliability of associate ratings of performance potential by Army aviators. Proceedings of the 18th Annual Meeting of the Military Testing Association.

Evaluates the reliability of the peer rating forms used to predict performance by Eastman & Leger (1978). For eight separate samples, coefficients of concordance range from .381 to .724. Six of the eight coefficients are statistically significant.

87. Eddowes, E. E. (1974). A cognitive model of what is learned during flying training (AFHRL-TR-74-63). Williams Air Force Base, AZ: Flying Training Division, Air Force Human Resources Laboratory.

Describes a cognitive model of the development of flying skill during flight training. Contrasts the traditional concept of flying skill as hand-eye coordination with a model which relates growth of skill to refinements in the student pilot's cognitive discriminations. No data are provided.

88. Eddowes, E. E., & King, N. W. (1975). Self-perceived problems of student pilots eliminated from undergraduate pilot training (AFHRL-TR-75-8). Williams Air Force Base, AZ: Air Force Human Resources Laboratory.

Gives results from interviews with 117 students eliminated from undergraduate pilot training. Similarities and differences among five categories of attrition are discussed. Major organizational and individual problem areas perceived to contribute to elimination are identified.

89. Eggenberger, J. C. (1976). Pilot selection research system (Report 76-7 & Annexes). Toronto Ontario: Canadian Forces Personnel Applied Research Unit.

Describes the pilot selection research project of the Canadian Armed Forces. Measures of the cognitive, affective, and psychomotor domains are included and linked, via task analysis, to measures of on-the-job performance. Components of the existing pilot selection system are described. New affective and psychomotor measures under evaluation are discussed. Complete descriptions of the

tests are contained in the Annexes. No validity data on the current measures are provided.

90. Elliott, S. J. (1982). RAAF aircrew (pilot) selection: The relationship of scores on test avinf to performance on pilot courses nos 108-119 at no 1 flight training school (Research Note 2/82). Canberra, Australia: Department of Defence (Air Force Office) Psychology Service.

(The distribution of this document has been restricted by the releasing agency. No data may be abstracted for public release. Consult the releasing agency for further information.)

91. Elliott, T. K., Joyce, R. P., & McMullen, R. L. (1979). The causes of attrition in initial entry rotary wing training (Report TF-79-B1). Alexandria, VA: U. S. Army Research Institute.

Examined all setbacks and eliminations occurring over a two year period. Data were obtained from official records, interviews, and paper-and-pencil questionnaires. Study found that most attrition was associated with causes not addressed by the selection system, and that additional screening should focus on character, personality, social development, and occupational preference. Comparisons of the average responses of eliminees and non-eliminees for the questionnaire items , Strong-Campbell Interest Inventory scales, 16PF scales, Flight Aptitude Selection Test scales, peer ratings, and Armed Forces Qualification Test composite scores are given. Many of the comparisons achieved statistical significance.

92. Elshaw, C. C., & Lidderdale, I. G. (1982). Flying selection in the Royal Air Force. Revue de Psychologie Appliquie (Supplement), 32, 3-13.
[Alternative citation is: Newsletter of the International Test Commission of the Division of Psychological Assessment of the International Association of Aviation Psychologists, 17, December 1982]

Describes the results of a study using light plane flying performance as a predictor of training outcomes from the RAF Basic Flying Training course. Brief history of "grading" (RAF use of light plane performance as a selector) is provided. For a sample of 53 pilot applicants, biserial correlations of approximately .70 and .85 were obtained between pass/fail in basic flying training and tests conducted after 9 and 14 hours of instruction, respectively.

93. Ericksen, S. C. (1952). A review of the literature on methods of measuring pilot proficiency (Research Bulletin 52-25). Goodfellow Air Force Base, TX: Human Resources Research Center.

Discusses the problems of measuring pilot proficiency as part of the process for validating pilot selection measures. Includes both military and civilian pilot studies. Reference list has 53 citations.

94. Feggetter, A. J. W., & Hammond, D. R. F. (1975). The relationship between personality, flying aptitude and performance in rotary wing training (APRE Advance Report no. 55). Middle Wollop, England: Army Personnel Research Establishment.

95. Fiske, D. W. (1947). Validation of naval aviation cadet selection tests against training criteria. Journal of Applied Psychology, 31, 601-614.

A summary of work performed during World War II at the Aviation Psychology Branch, Division of Aviation Medicine, Bureau of Medicine and Surgery, Department of the Navy. Reports validities for three paper-and-pencil measures. In addition, reports a positive relationship (r = .24) between training success/failure and previous flight training, and an inverse relationship (r = -.19) between training outcome and age.

SAMPLE: N = 2,356 (A), 1,818 (B), 2,073 (C); United States; Navy

CRITERION: Pass/Fail ; Training

PREDICTOR	SAMPLE	CRITERION CORRELATION A	B	C
Wonderlic's Personnel Test		.17	.11	.08
Bennett's Mechanical Comprehension Test		.35	.32	.27
Biographical Inventory		.30	.33	.35

96. Fitts, P. M. (1946). German applied psychology during World War II. American Psychologist, 1, 151-161.

Report on interviews held in Germany immediately following World War II. Briefly describes some pre-war research efforts. Procedures and tests used for pilot selection during the war are described in detail. No validity data are provided.

97. Flanagan, J. C. (1942). The selection and classification program for aviation cadets (aircrew-bombardiers, pilots, and navigators). Journal of Consulting Psychology, 5, 229-238.

Review of the selection and classification of aircrew between 1924 and 1942. Describes the Aviation Cadet Qualifying Examination, used for pilot selection, and some of the research underway at the time. No validity data are given.

98. Flanagan, J. C. (1948). The aviation psychology program in the Army Air Forces. AAF Aviation Psychology Program Research Report No. 1. Washington, DC: U. S. Government Printing Office.

This report (the first in the series of 19) provides an overview and summary of the World War II aviation psychology program in the Army Air Force. The origins and development of the program are described, along with the conditions and status of aircrew selection in 1941 from which the program evolved. The report also provides a description of an experiment in which over 1,000 men were admitted to pilot training without regard for their scores on the selection tests. Of the 1,143 men admitted, 582 were eliminated during primary, 83 during basic, and 24 during advanced flying training. From this sample, a biserial correlation of .64 was obtained between pass/fail and the stanine score generated from the selection tests.

99. Fleischman, H. L., Ambler, R. K., Peterson, F. E., & Lane, N. E. (1966). The relationship of five personality scales to success in naval aviation training (NAMI - 968). Pensacola, FL: Naval Aerospace Medical Institute.

Evaluated five personality scales as predictors of success in U. S. naval aviation training. The scales used were: (1) Cattell 16PF; (2) Taylor Manifest Anxiety; (3) Alternate Manifest Anxiety Scale; (4) Pensacola Z Scale (measure of authoritarianism);and, (5) Adjective Check-List. The majority of these personality measures were essentially unrelated to the training criteria. Only the Taylor Manifest Anxiety Scale and Factor C from the 16PF showed significant, but small (r=.10) relationships with a pass/fail criterion.

100. Fleishman, E. A. (1954). Evaluations of psychomotor tests for pilot selection: the direction control and compensatory balance tests (AFPTRC-TR-54-131). Lackland Air Force Base, TX: Air Force Personnel & Training Research Center.

Describes two new psychomotor tests and their validation for use in pilot selection. Also gives validities for component tests of the Aircrew Classification Battery. Intercorrelations of new tests and other measures are given, along with multiple regression analyses.

SAMPLE: N = 1,003 (A), 3,308 (B); United States; Air Force

CRITERION: Pass/Fail; Training

PREDICTOR	CRITERION CORRELATION SAMPLE A	B
Pilot Stanine	.51	.50
Arithmetic Reasoning	.11	.10
Biographical Inventory	.25	.28
Coordinate Reading	.18	.20
Dial and Table Reading	.24	.24
General Information	.31	.32
Instrument Comprehension	.23	.17
Mechanical Information	.27	.26
Mechanical Principles	.28	.21
Numerical Operations	.03	.10
Practical Judgement	.16	.10
Reading Comprehension	.07	.10
Spatial Orientation I	.14	.10
Spatial Orientation II	.25	.25
Electrical Information	.16	.11
Pattern Orientation	.24	.22
Ratio Estimation	.14	.17
Complex Coordination	.45	.41
Discrimination Reaction Time	.25	.26
Rotary Pursuit	.27	.27
Rudder Control	.39	.39

SAMPLE: N = 968 (A), 1,000 (B); United States; Air Force

CRITERION: Pass/Fail; Training

PREDICTOR	CRITERION CORRELATION SAMPLE A	B
Direction Control Test	.33	--
Compensatory Balance Test		
Corrects	--	.27
Errors	--	-.21
Smoothness	--	.00

101. Fleishman, E. A. (1956). Psychomotor selection tests: research and application in the United States Air Force. Personnel Psychology, 9, 449-467.

Describes psychomotor tests used for pilot selection and additional tests under development.

SAMPLE: N = 1,000 (Approx.); United States; Army Air Corps

CRITERION: Pass/Fail; Training

PREDICTOR	CRITERION CORRELATION
Complex Coordination Test	.45
Rudder Control Test	.40
Rotary Pursuit	.30

Pursuit Confusion	.30
Two-Hand Coordination	.30 to .35
Direction Control	.34

102. Fleishman, E. A., & Ornstein, G. N. (1960). An analysis of pilot flying performance in terms of component abilities. Journal of Applied Psychology, 44, 146-155.

A factor analysis of measures of flying proficiency obtained from 24 separate maneuvers by student pilots. Factors identified were: Control precision, spatial orientation, multilimb coordination, response orientation, rate control, and kinesthetic discrimination. Results are not discussed in terms of identification of measures to be assessed by selection instruments, but results could be applied to selection problem.

103. Flyer, E. S., & Bigbee, L. R. (1954). The light plane as a pre-primary selection and training device: III. Analysis of selection data (AFPTRC-TR-54-125). Lackland Air Force Base, TX: Air Force Personnel & Training Research Center.

Describes the results of a study in which 120 students were given 25 hours of light-plane training prior to entering pilot training, and matched against a sample of 120 control students who received no such training.

Reported correlations ranging from .18 to .51 between success in pilot training and a variety of measures taken from the light-plane training. They found that "...flight instructor evaluations made during the light plane phase emerged as the most promising single variable."

104. Fowler, B. (1981). The aircraft landing test: an information processing approach to pilot selection. Human Factors, 23, 129-137.

Describes an information processing approach to pilot selection which resulted in the development of an Aircraft Landing Test. This test was a simulation, presented on a Cathode Ray Tube display, of the approach and landing of a light aircraft onto a runway. Movement of the aircraft was controlled by a stick and throttle, and the display consisted of a simple representation of an aircraft centered in the display, the horizon line and the runway outline, and power, altitude, heading and airspeed indicators. Subjects practiced landing the aircraft on the runway for up to three 30-minute sessions, with standardized instruction being provided during the first 15 minutes of the first session. Several scores were produced, including number of approaches to first safe landing and number of approaches to three safe landings in a row. Flying performance criteria were obtained from two standardized flight grading tests

administered at 7 and 12 flying hours in a light aircraft as part of the Canadian Forces flying training system.

SAMPLE: N = 26 (A), 104 (B); Canada; Military

CRITERION: Performance Scores; Training

PREDICTOR	CRITERION CORRELATION	
	7-Hour Check	12-Hour Check
Group 1 - Previous Flying Experience (Sample A)		
AL-1	.27	.32
AL-2	.42	.46
AL-3	.46	.49
AL-4	.41	.45
Group 2 - No Previous Flying Experience (Sample B)		
AL-1	.32	.36
AL-2	.40	.44
AL-3	.41	.45
AL-4	.30	.32

105. Geldard, F. A., & Harris, C. W. (1946). Selection and classification of aircrew by the Japanese. American Psychologist, 1, 205-217.

Reports on interviews with many of the officials who had been actively engaged in the administration of psychological tests and applicant interviews. Because of an order issued just prior to the final surrender, most of the records of the Japanese selection and classification programs were destroyed. However, some copies of tests and copies of the apparatus tests used by both services were recovered. A listing of tests used by the Japanese army and their estimated (based upon recollections of former officials) correlations with training outcomes are provided. In the use of this battery for the selection of aircrew, the psychomotor tests were used not to select, but rather to classify otherwise qualified individuals as pilot or other aircrew. The final assessment was made by psychologists, and an estimated validity coefficient of .60 to .65 is claimed for the overall process. A somewhat lower validity coefficient of .30 to .40 was reported (again based upon the recollections of Japanese former officials) for the battery of tests used for selection of pilots by the Japanese navy. This battery consisted of an intelligence test with twelve parts, a test of mental addition, and six psychomotor tests.

In addition, the Japanese air force used two tracking tests and a digit recognition test as part of their aircraft classification procedures, while the Japanese navy used two pursuit tracking tasks, a selective reaction task memory of speed task, and figure regeneration task in their aircrew

selection.

106. Gillespie, R. D., & Reid, D. D. (1945). The prediction of failure in flying training and in operations by the brief psychiatric interview (Report No. 641). London, England: Flying Personnel Research Committee, Royal Air Force, Ministry of Defence.

From a twelve minute interview of 611 aircrew cadets, assessments were made of the degree of predisposition to failure in pilot training for psychological reasons. Sixteen different traits or characteristics (such as leadership, tendency to depression, sociability) were assessed, and a summary score on a five point scale produced. Of 235 cadets who eventually went through flight grading, there was no significant relationship between the psychiatric evaluation and flying performance. Of 140 cadets who went on to pilot training, 26 were judged to be predisposed to failure, and 114 were non-predisposed. The failure rates for those two groups were 26.9% and 9.7%, respectively. The difference is statistically significant.

107. Goebel, R. A., Baum, D. R., & Hagin, W. V. (1971). Using a ground trainer in a job sample approach to predicting pilot performance (AFHRL-TR-71-50). Williams Air Force Base, AZ: Flying Training Division, Air Force Human Resources Laboratory.

Administered a 6-hour syllabus of flight instruction in a general aviation trainer (GAT-1) to a sample of approximately 100 students prior to their entry into the T-41 light-plane screening program used by the US Air Force to determine admission to Undergraduate Pilot Training (UPT). The subjects learned tracking tasks which involved tracing outlines of contours on the wall outside the GAT-1 with a dot of light projected from the nose of the GAT-1, as well as aircraft maneuvers such as straight-and-level instrument flight and turns and descents. Objective performance data using the computer system were collected; however, this report addresses only the subjective predictors provided by the flight instructors who administered the syllabus. The correlation between the GAT-1 Instructor Evaluations and the Final T-4 Grade (adjusted so as to provide a 12-category scale similar to that used in the GAT-1 instructor's grades) was found to be 0.50. Correlations between the GAT-1 Instructor Evaluations and performance in basic (T-37 aircraft) flying training were 0.23, 0.29, 0.16 and 0.30, for the Midphase,T-37 Trainer (Final), T-37 Instrument (Final), and T-37 Contact (Final),grades, respectively. Of these correlations, only that between the GAT-1 and T-37 Instrument grades was non-significant. Correlations between the T-41 (light-plane) and T-37 grades, as listed before, were 0.12, 0.38, 0.16, and 0.19, respectively. Of these, only the correlation between the T-41 and T-37 Trainer (Final) grades

was significant. However, some attenuation of the correlations between the T-41 and T-37 grades was expected, as performance in the T-41 was used to eliminate individuals from training.

108. Gopher, D. (1982). A selective attention test as a predictor of success in flight training. Human Factors, 24, 173-183.

Describes a study in which a group of Israeli flight cadets took the Dichotic Listening Test. In this study significant differences were noted between successful and unsuccessful flight training groups on omissions, intrusions, and switching error scores taken from the test. Correlations were obtained between the three test scores and a graded flight criterion (scaled 1 to 7). While these correlations were somewhat lower than expected based upon the previous study, they made a substantial contribution to the selection algorithm as they were essentially orthogonal to the other selection measures.

SAMPLE: N = 1308; Israel; Military

CRITERION: Performance Scores; Training

PREDICTOR	CRITERION CORRELATION
Psychomotor Battery	.223
Two-Hand Coordination	.175
General Knowledge	.194
Mathematics	.148
Youth Movement Activity	.104
Sports Activity	.023
Interview/Personality Evaluation	.420
Taylor Anxiety Scale	-.049
Attention	
Omissions	-.145
Intrusions	-.128
Switching Errors	-.178

109. Gopher, D., & Kahneman, D. (1971). Individual differences in attention and the prediction of flight criteria. Perceptual and Motor Skills, 33, 1335-1342.

Describes the development of a test based on studies in experimental psychology dealing with focused or divided attention. The procedure for conduct of the test (Dichotic Listening Test) is described in detail. The test requires subjects to attend selectively to one of two messages simultaneously presented to the two ears. Correlations with a pass/fail criterion are given. In a concurrent validity study conducted at the same time, pilots of faster aircraft were significantly better on the test than pilots of slower (transport) aircraft.

SAMPLE: N = 100; Israel; Air Force

CRITERION: Pass/Fail; Training

PREDICTOR	CRITERION CORRELATION
Part I Omissions	.26
Part II	.36

110. Gopher, D., & North, R. A. (1974). The measurement of operator capacity by manipulation of dual-task demands (Technical Report ARL-72-21). Urbana-Champaign, IL: Aviation Research Laboratory, University of Illinois at Urbana-Champaign.

Described a procedure for the assessment of an individual's capacity by the manipulation of the demands of two concurrent tasks. Procedures required the subject to perform a one dimensional tracking task and/or a digit processing task. Subjects performed each task singly to obtain a base-line performance level, and then both tasks together. During the dual-task phase the single-task performance levels were used as performance objectives, and the cumulative dual-task performance was displayed so that the subjects could see how well their current performance matched the desired (base-line) performance level. During this phase, both tasks were given equal priority. During a third phase of dual-task performance, the relative priorities of the two tasks were varied, and the desired performance level was based upon the performance during phase 2. For several measures taken from the dual-task portion of this test procedure, significant differences were obtained between student pilots rated as high- or low-potential by their instructors after ten hours of dual instruction in a civilian light plane training program. The single-task measures, however, did not discriminate between the high- and low-potential groups. Total sample size was 32.

111. Gordon, H. W., & Leighty, R. L. (1988). Importance of specialized cognitive function in the selection of military pilots. Journal of Applied Psychology, 73, 38-45.

For a sample of 600 US Navy pilot trainees, visuospatial ability (as measured by the Cognitive Laterality Battery) was found to be positively associated with success in training. Verbosequential ability was unrelated to success of itself, however there was an interaction between the two abilities such that high verbosequential ability positively influenced the training success probability of students low in visuospatial ability, but decreased the probability of success of students high in visuospatial ability.

112. Gordon T. (1949). The airline pilot's jobs. Journal of Applied Psychology, 33, 122-131.

Reports a study in which the personnel records of 432 pilots from five airlines were examined and compared a group of pilots dismissed because of lack of flying proficiency to a group of successful pilots, matched to the dismissed group on time of hire. No significant differences were found between the two groups on: (1) Age; (2) Previous Education; (3) Otis I. Q., (4) Bennett Mechanical Comprehension Test; (5) Minnesota Multiphasic Personality Inventory (MMPI); (6) Previous Flying Hours; (7) Martial Status; or, (8) Previous Ground Training. However, the sample sizes involved varied across the various tests, and were quite small for the MMPI and Mechanical Comprehension Test (N = 14 to 17). In addition to the comparisons of the dismissed and successful pilots, an analysis was also performed of the critical requirements of the airline pilot's job, which led to a list of some 21 requirements, ordered on the basis of the frequency of errors in accidents, incidents, and flight-checks. It is suggested, that in addition to serving as a guide to check-pilots, the list of critical requirements could also be useful in devising improved methods of pilot selection.

113. Gray, N. H. (1978). Canopy over Israel: Eyewitness reports on the selection, training, and assignment of personnel in the Israel Air Force. San Diego, CA: Personnel Training and Analysis Office, NAVSEACEN PAC.

This is a report on the Israeli Air Force, based upon visits by the author and other personnel during the period 1977 to 1978. The report describes the strategic and industrial position of Israel and the general requirements for military service. The procedures leading to selection as a pilot and the training received are described. Selection takes place over a multi-year period and includes personality, aptitude, and mechanical and coordination ability tests. No validity data for the selection procedures are provided.

114. Graybiel, A., & West, H. (1945). The relationship between physical fitness and success in training of U. S. Naval flight students. Journal of Aviation Medicine, 16, 242-249.

A study of 1,076 flight students (1,000 graduates and 76 attrites). Physical fitness was assessed by means of the pack or step tests which require strenuous, short-term exertion. Overall physical conditioning and athletic ability were assessed by a composite fitness test which included a test battery, sports competition, and instructional athletics. Results showed no relationship between physical fitness and flight performance.

115. Greene, R. R. (1947) Studies in pilot selection. II. The ability to perceive and react differentially to configuration changes as related to the piloting of light aircraft. Psychological Monographs, 61, 18-28.

An evaluation of a psychomotor test (Indirect Vision Test) in which the subject was required to respond to a signal presented in his peripheral vision, while simultaneously attending to a secondary task presented in the fovial vision. Intercorrelations of the new test and existing tests are given, along with correlations with the criterion (overall flight performance).

SAMPLE: N = 88; United States; Civilian

CRITERION: Performance Score; Training

PREDICTOR	CRITERION CORRELATION
Otis Quick Scoring Test	-.157
Mechanical Comprehension	.279
Desire-to-Fly	-.012
Aviation Information	.195
Two-Hand Coordination	.006
Indirect Vision Test	-.089

116. Griffin, G. R., & McBride, D. K. (1986). Multitask performance: predicting success in naval aviation primary flight training (NAMRL-1316). Pensacola, FL: Naval Aerospace Medical Research Laboratory.

Evaluated the Complex Coordination Test on the Psychomotor Test Device developed by the US Air Force and the Dichotic Listening Test, as predictors of flight training success, singly and in combination.

SAMPLE: N = 50; United States; Navy

CRITERION: Pass/Fail; Training

PREDICTOR	CRITERION CORRELATION
Psychomotor Test Device	
Session 1	-.283
Session 2	-.028
Session 3	-.241
Session 4	-.120
Dichotic Listening Test	
Written Response	.360
Keypad Response	.162
Vocal Response	.224
Psychomotor Test With Dichotic Listening Test (Keypad Response)	.036

Psychomotor Test With Dichotic Listening Test (Vocal Response)	-.002
Dichotic Listening Test (Keypad Response) With Psychomotor Test	.413
Dichotic Listening Test (Vocal Response) With Psychomotor Test	.395
Aviation Qualification Test	.172
Flight Aptitude Rating	.361

117. Griffin, G. R., Morrison, T. R., Amerson, T. L., & Hamilton, P. V. (1987). Predicting air combat maneuvering (ACM) performance: fleet fighter ACM readiness program grades as performance criteria (NAMRL-1333). Pensacola, FL: Naval Aerospace Medical Research Laboratory.

In a study of performance measures for air combat maneuvering (ACM) evaluation, measures from the Dichotic Listening Test administered in conjunction with the Complex Coordination Test, were found to correlate significantly with measures of ACM performance. Single task measures did not correlate significantly; however the sample size was quite small (N = 18), making interpretation difficult.

118. Griffin, G. R., & Mosko, J. D. (1977). Naval aviation attrition 1950-1976: Implications for the development of future research and evaluation (NAMRL Report 1237). Pensacola, FL: Naval Aerospace Medical Research Laboratory.

A review of the categories and causes of attrition from naval aviation training. The selection research literature dealing with each category of attrition is briefly summarized, and 188 references are given.

119. Griffin, G. R., & Mosko, J. D. (1982). Preliminary evaluation of two dichotic listening tasks as predictors of performance in naval aviation undergraduate pilot training (NAMRL-1287). Pensacola, FL: Naval Aerospace Medical Research Laboratory.

Evaluated two versions of the dichotic listening test as predictors of pilot training performance. Both versions of the test (clear and with background noise) were found to be reliable with test/retest correlations of .77 or more. Scores from neither version were significantly correlated with the pass/fail criterion for the initial administration. However, the scores from the retest of the Clear DLT did correlate (.292 to .497) significantly with the criterion. Possible explanations for these findings and suggestions for additional research are given.

120. Guilford, J. P., & Lacey, J. I. (1947). Printed classification tests. AAF Aviation Psychology Program Research Report No. 5. Washington, DC: U. S. Government Printing Office.

Describes the printed tests used for selection and classification of aircrew, to include their development, content, and validity. Also reports extensive factor analyses of the tests, and analyses of traits and abilities related to the pilot's job. Of particular interest is Table 28.18 which contains the validities for all tests described in the volume. Data reported below were extracted from that table and represent only a few of the many tests for which data are available.

SAMPLE: N = approx. 10,000 ; United States ; Army Air Force

CRITERION: Pass/Fail; Training

PREDICTOR	CRITERION CORRELATION	N
Biographical Data	.30	7,924
Dial & Table Reading	.22	10,925
General Information	.24	12,043
Instrument Comprehension I	.20	9,284
Mathematics B	.10	18,657
Mechanical Principles	.37	10,925
Reading Comprehension	.20	10,925
Spatial Orientation I	.20	10,925
Speed of Identification (Rotated)	.18	10,925

121. Guinn, N., Vitola, B. M., & Leisey, S. A. (1976). Background and interest measures as predictors of success in undergraduate pilot training (AFHRL-TR-76-9). Lackland Air Force Base, TX: Personnel Research Division, Air Force Human Resources Laboratory.

Irvestigation of the use of biographical data for the selection of USAF pilot trainees. A 116-item inventory containing background and attitudinal items (Officer Background and Attitude Survey-OBAS) was given to 593 officer trainees slated to attend pilot training. This sample was split in half and four keys developed from item analyses. The validities of those four key scores for the development and cross-validation samples are reported.

In addition to the OBAS, the Strong Vocational Interest Blank (SVIB) was also administered. Several of the standard scales of the SVIB were found to correlate significantly with a pass/fail criterion, with the four highest being: (1) Librarian (r = 0.22); (2) Army Officer (r = .15); (3) Air Force Officer (r = 0.15); and, (4) Computer Programmer (r = 0.15).

SAMPLE: N = 593; United States; Air Force

CRITERION: Pass/Fail; Training

PREDICTOR	CRITERION CORRELATION	
	Development Validity (N = 290)	Cross-Validity (N = 290)
Total Elimination Key	.37	.13
Flying Deficiency Elimination Key	.40	.14
Self-Initiated Elimination Key	.32	.06
Motivational Deficiency Elimination Key	.37	.06

122. Guttmann, G., Bauer, H., & Trimmel, M. (1982). A computer-supported psychological and psychphysiological test-battery for aircraft-pilot selection. (Unpublished manuscript) Vienna, Austria: University of Vienna.

Describes the development and content of a battery of performance tests, including psychomotor coordination, spatial perception, risk-taking behavior, and anticipation of motion. Report stresses the need to evaluate performance while under stress, as opposed to testing under relaxed, laboratory conditions. No validity data are given.

123. Henmon, V. A. C. (1919). Air Service tests of aptitude for flying. Journal of Applied Psychology, 3, 103-109.

Reports on a variety of measures including such tests as Perception of Tilt, Complex Reaction Time, and Equilibrium, as predictors of pilot performance. The Thorndike Mental Alertness Test was one of the best measures for pilot selection, with a correlation of .23 with a rating of flying ability. Includes a narrative account of selection and aviator training procedures and brief descriptions of the tests which were evaluated as selectors. Validity data for several of the tests are given.

124. Hertli, P. (1982). The prediction of success in Army aviator training: A study of the warrant officer candidate selection process (Unpublished Report). Fort Rucker, AL: U. S. Army Research Institute Field Unit.

Evaluated components of the Armed Services Vocational Aptitude Battery (ASVAB), used for enlisted and warrant officer candidate selection, as predictors of flight training performance. Also included the Flight Aptitude Selection Test (FAST) used for all aviator selection.

SAMPLE: N = 1,618; United States; Army

CRITERION: Performance Scores; Training

PREDICTOR	CRITERION CORRELATION		
	Overall Grade	Flight Grade	Academic Grade
Age	-.20	-.25	-.06
Education	.04	-.03	.13
ASVAB General Technical	.18	.06	.27
ASVAB Skill Tech	.24	.12	.32
ASVAB Motor Maintenance	.17	.07	.25
ASVAB General Maintenance	.22	.13	.27
ASVAB Clerical	.13	.06	.18
FAST	.29	.23	.26
Multiple Correlation	.42	.39	.40

125. Hill, J. W., & Goebel, R. A. (1971). Development of automated GAT-1 performance measures (AFHRL-TR-71-18). Williams Air Force Base, AZ: Flying Training Division, Air Force Human Resources Laboratory.

Described the development of a simulator-based job-sample test, based upon a General Aviation Trainer (GAT-1) light-plane simulator connected to a small minicomputer. Measures taken from the flight simulator were found to be related to experience level of the pilots. Although the purpose of the present study is primarily to develop a system for evaluating pilot performance, this job-sample test was modified by Long & Varney (1977) and used in the prediction of training performance.

126. Holtzman, W. H., & Sells, S. B. (1954). Prediction of flying success by clinical analysis of test protocols. Journal of Abnormal and Social Psychology, 49, 485-490.

Describes a study of 50 successful pilot trainees and 50 trainees eliminated from training because of overt personality disturbances. They found "...there is little doubt that the clinical assessments of beginning aviation cadets have no relationship to a criterion of adjustment in the basic flight-training program".

The six tests used in this study were: (1) Background Information; (2) Ink-Blot Test; (3) Feeling and Doing (a

psychosomatic inventory); (4) What Is He Saying (a sentence completion test); (5) L-D Test (a group test version of the Szondi Test); and, (6) Drawing Test (a group test version of the Draw-a-Person Test).

127. Hopkins, P. (1944). Observations on army and air force selection and classification procedures in Tokio, Budapest, and Berlin. The Journal of Psychology, 17, 31-37.

Describes observations made prior to World War II in Tokyo, Budapest, and Berlin. Reports that some measures of what were termed "Lebenslauf-Analyse" (personality measures) were in use by the Germans during his visit to Berlin in 1936. General descriptions of tests and selection procedures are given; however no validity data are provided.

128. Hopson, J. A., Griffin, G. R., Lane, N. E., & Ambler, R. K. (1978). Development and evaluation of a naval flight officer scoring key for the Naval Aviation Biographical Inventory. (NAMRL-1256). Pensacola, FL: Naval Aerospace Medical Research Laboratory.

Describes the development and cross-validation of a biographical inventory for the selection of naval flight officers. Because it was found that the predictive validity of the existing inventory was common to that of the Mechanical Comprehension Test, the new inventory was constructed specifically to minimize the intercorrelation with the existing selection tests.

SAMPLE: N = 607; United States ; Navy Flight Officers (Non-pilots)

CRITERION: Pass/Fail; Training

PREDICTOR	CRITERION CORRELATION
Academic Qualification Test	.121
Mechanical Comprehension Test	.141
Spatial Apperception Test	.133
Biographical Inventory	.204

129. Hulin, C. L., & Alvares, K. M. (1971). An evaluation of three possible explanations of the temporal decay in predicting pilot performance (AFHRL-TR-71-5). Williams Air Force Base, AZ: Flying Training Division, Air Force Human Resources Laboratory.

Examined the relationships between ability measures and flying performance measures during flight training. For a sample of 80 civilian flight students, changes were found in ability levels as a function of flight training. In

addition, the contributions of abilities to flight check performance was found to vary during the training period. Data are interpreted as supporting a model which allows for changes in individuals and simultaneous changes in the composition of the tasks.

130. Hunter, D. R. (1977). Pilot selection research in the Air Force. Proceedings of the 19th Annual Meeting of the Military Testing Association.

Describes ongoing work utilizing computer-administered psychomotor coordination tests (Complex Coordination and Two-Hand Coordination) as predictors of pilot training performance. Content of the Air Force Officer Qualifying Test, which is the primary selection instrument for pilot selection, is also discussed. General results and avenues for future research are given. No validity data are provided.

131. Hunter, D. R. (1982). Air Force pilot selection research. Paper presented at the 90th Annual Meeting of the American Psychological Association. Washington, DC.

Describes the results of two studies of a portable implementation of the Two-Hand Coordination Test and Complex Coordination Test at field sites. On a sample of 475 Reserve Officer Training Corps cadets tested while still attending university, correlations with a pass/fail criterion of -.37 and -.163 (both significant, $P < .05$) were obtained with the X-axis and Y-axis control score, respectively, from the Two-Hand Coordination Test. Correlations of -.135, -.124, and -.119 (again, all significant) were obtained with the X-axis and Y-axis and Z-axis (rudder-bar) control scores, respectively, from the Complex Coordination Test. Composite scores, formed by summing the transformed (Z-score) value for each control score, were generated for both the Two-Hand Coordination Test and the Complex Coordination Test, and were found to correlate -.159 and -.165, respectively, with the pass/fail criterion. In a second sample, consisting of 209 individuals attending the Officer Training School prior to entry into flying training, correlations of -.125 and -.156 were found between the pass/fail criterion and composite scores from the Two-Hand Coordination Test and Complex Coordination Test, respectively. Correlations between the simple control scores and the criterion were similar to those found in the larger sample of ROTC cadets. Studies which utilized a Zero Input Tracking Analyzer (coordination test) and a Pilot Aptitude Measurement System (see Long & Varney, 1975) are also briefly described.

SAMPLE: N = 475 (A), 209 (B); United States; Air Force

CRITERION: Pass/Fail; Training

PREDICTOR	CRITERION CORRELATION SAMPLE A	B
Two-Hand Coordination: X-Axis	-.14	-.17
Two-Hand Coordination: Y-Axis	-.16	-.07
Two-Hand Coordination Composite	-.16	-.13
Complex Coordination: X-Axis	-.14	-.17
Complex Coordination: Y-Axis	-.12	-.05
Complex Coordination: Z-Axis	-.12	-.18
Complex Coordination Composite	-.17	-.16

132. Hunter, D. R. (1987). Automated aircrew aptitude assessment: historical perspective. Ottawa, Canada: Proceedings of the Military Testing Association.

A review of the development of automated measures for the selection of pilots. Compares development of this approach in the United States and the United Kingdom. No validity data are given.

133. Hunter, D. R. (1989). Aviator selection. In M. Wiskoff & G. Rampton (Eds.), Military Personnel Measurement. New York: Praeger.

Narrative review of aviator selection literature from approximately 1915 to around 1987. Classifies studies into one of four groups according to selection measures utilized: (1) Paper-and-Pencil Cognitive Ability Tests; (2) Personality, Interest, and Background Information Tests; (3) Psychomotor and Information-Processing Tests; and, (4) Light-Plane and Job-Sample Tests.

134. Hunter, D. R., & Burke, E. F. (1987). Computer-based selection testing in the Royal Air Force. Behavior Research Methods, Instruments, & Computers, 19, 2, 243-245.

Describes the development of computer-based selection tests for air traffic controllers, fighter controllers, and aircrew in the Royal Air Force. Some tests are briefly described, however no validity data are given.

135. Hunter, D. R., Maurelli, V. A., & Thompson, N. A. (1977). Validation of a psychomotor/perceptual test battery (AFHRL-TR-77-28). Brooks Air Force Base, TX: Personnel Research Division, Air Force Human Resources Laboratory.

Report of the validation of a battery of computer-based tests for a sample of enlisted personnel and navigators. Descriptions of the tests are provided, along with intercorrelations and descriptive statistics for all groups.

SAMPLE: N = 77; United States; Air Force Navigators

CRITERION: Pass/Fail; Training (Navigator)

PREDICTOR	CRITERION CORRELATION
Air Force Officer Qualifying Test	
- Pilot Composite	.06
- Navigator Composite	.08
- Officer Quality Composite	.07
- Verbal Composite	.04
- Quantitative Composite	.15
Kinesthetic Memory	
- Correct Answers	.24
- Response Time	-.32
Perceptual Speed	
- Correct Answers	.05
- Perception Time	-.16
- Response Time	-.17
Performance under Stress	
- Correct Answers	.13
- Perception Time	.05
- Response Time	.01
Associative Learning	
- Correct Answers (Part 1)	.07
- Correct Answers (Part 2)	.11
Memory (Immediate/Delayed)	
- Correct Answers (Part 1)	.23
- Correct Answers (Part 2)	.14
Concept Identification	
- Correct Answers	.11
Performance under Divided Attention	
- Line Error - Minute 1	-.03
- Line Error - Minute 2	-.22
- Line Error - Minute 3	-.08
- Line Error - Minute 4	-.08
- Tone Error - Minute 1	-.07
Tone Error - Minute 2	-.01
- Tone Error - Minute 3	-.06
- Tone Error - Minute 4	-.03

136. Hunter, D. R., & Thompson, N. A. (1978). Pilot selection system development (AFHRL-TR-78-33). Brooks Air Force Base, TX: Personnel Research Division, Air Force Human Resources Laboratory.

Report summarizes several years of research on pilot selection. Paper-and-pencil tests, psychomotor coordination tests, interest, and job-sample tests are described and validity data provided.

SAMPLE: N = 245; United States; Air Force

CRITERION: Pass/Fail; Training

PREDICTOR	CRITERION CORRELATION
Scale Reading	.19
Letter Sets	.10
Tool Functions	.04
Electrical Information	.02
Mechanical Principles	.10
Word Knowledge	.03
Word Grouping	-.01
Verbal Analogies	.13
Block Counting	.18
Point Distance	.04
Electrical Maze	.13
Pattern Detail	.07
Rotated Blocks	.08
Tools	.04
Figure Analogies	.01
Hidden Figures	.05
Answer Sheet Marking	.05
Table Reading	.17
Large Tapping	.05
Trace Tapping	.05
Discrimination-Reaction	.06

SAMPLE: N = 257; United States; Air Force

CRITERION: Pass/Fail; Training

PREDICTOR	CRITERION CORRELATION
Officer Background and Attitude Survey Total Elimination Key	.15
Officer Background and Attitude Survey Flying Deficiency Elimination Key	.13
Strong Vocational Interest Blank	
Air Force Scale I	.13
Air Force Scale II	.16
Air Force Scale III	-.06

SAMPLE: N = 150 (A), 137 (B); United States; Air Force

CRITERION: Pass/Fail; Training

PREDICTOR	CRITERION CORRELATION SAMPLE A	B
Two-Hand Coordination Test	-.14 to -.20	-.13 to -.21
Complex Coordination Test	-.15 to -.24	-.16 to -.22
Complex Coordination Test Composite Score	--	-.29

SAMPLE: N = 140 (A), 116 (B); United States; Air Force

CRITERION: Pass/Fail; Training

PREDICTOR	CRITERION CORRELATION SAMPLE A	B
Factor I - Heading	.18	.18
Factor II - Bank	.17	.15
Factor III - Altitude	.00	.20
Factor IV - Side Slip	.15	.16
Factor V - Bank II	.20	.06
Factor VI - Position	-.04	.20
Average Bank Angle Deviation	.28	.27
Average Side Slip Deviation	.19	.15
Average Heading Deviation	.27	.09
Average Altitude Deviation	.20	.18
Composite Parameter Score	.30	.25

137. Imhoff, D. L., & Levine, J. M. (1981). Perceptual-motor and cognitive performance task battery for pilot selection (AFHRL-TR-80-27). Brooks Air Force Base, TX: Manpower and Personnel Division, Air Force Human Resources Laboratory.

Reports on a review of the literature on pilot selection and perceptual-motor and cognitive processes and a proposed task battery. Tests proposed for inclusion in the battery are described in detail. No validity data are provided. [Many of these tests are included in the Basic Abilities Test battery described by Carretta (1987). DRH]

138. Ingram, D. L. (1968). Recent research in the selection and training of aircraft pilots for the Canadian armed forces. Proceedings of the 10th Annual Meeting of the Military Testing Association.

Narrative description of the Canadian pilot selection and training process. Describes an experiment which evaluated a light-plane screening process. Students receiving light-plane training had a higher graduation rate in jet training (60% versus 51%) that did matched controls. Scores taken from the light-plane training were also shown to contribute to prediction of success; however specific validity data are not provided.

139. Intano, G. P., & Lofaro, R. J. (1988). Army aviator classification by aircraft type. Human Factors Bulletin, 1988, 2-4.

Brief description of the development of a classification algorithm for US Army aviators. An algorithm was produced

by assigning weights obtained from experienced pilots to scores from an extensive test battery. The algorithm predicted membership in four training tracks: Attack, combat assault, scout, or utility. No validity data are provided.

140. Intano, G. P., Lofaro, R. J., & Howse, W. R. (1989). Exploratory research and development and preliminary validation of the Army aviation classification process. In Proceedings of the Military Testing Association. San Antonio, TX:

The development of an algorithm for classification of Army aviators into one of a number of training tracks is described. The process involved both the collection of expert opinions regarding critical abilities for difference aircraft missions and the acquisition or development of a comprehensive test battery. The preliminary validation results support the utility of the classification algorithm. No correlations between individual predictors and training performance are given.

141. James, D. J. (1964). Prediction of performance in the early stages of flying-training. In A. Cassie, S. D. Fokkema, & J. B. Parry (Eds.), Aviation Psychology. The Hague: Mouton.

Discusses problems related to the variability of predictive validity coefficients and the relative advantages and attributes of criteria based upon failures and those based upon numerical, end-of-training grades.

142. Jessup, G. (1969). The validity of the Eysenck Personality Inventory in pilot selection (Memo No. 162). London, England: Science 4 (Royal Air Force), Ministry of Defence.

Administered the Eysenck Personality Inventory (EPI) to 167 Royal Air Force pilot trainees and found significant differences in the failure rates for individuals in the four quadrants of the EPI (Introvert - Extrovert, Neurotic - Stable). Failure rates were highest (60%) among those individuals in the neurotic-introvert quadrant and lower (14%) among those in the stable-introvert quadrant.

143. Jessup, G., & Jessup, H. (1971). Validity of the Eysenck Personality Inventory in pilot selection. Occupational Psychology, 45, 111-123.

This report duplicates that described under Jessup (1969).

144. Joaquin, J. B. (1980a). A model for the selection of Canadian Forces aircrew (Working Paper 80-11). Willowdale, Ontario: Canadian Forces Personnel Applied Research Unit.

Briefly reviews studies conducted from 1970 to 1980 aimed at improving aircrew selection in the Canadian Forces and describes the current aircrew selection procedures. A general model for aircrew selection is proposed which would include: (1) aptitudes/abilities/personological assessment; (2) Roles perception clarification; and, (3) motivational assessment. These elements, in conjunction with medical examinations would be utilized in a consolidates assessment of potential. Seventy-one references are cited. No validity data are given.

145. Joaquin, J. B. (1980b). The Personality Research Form (PRF) and its utility in predicting undergraduate pilot training performance in the Canadian Forces (Working Paper 80-12). Willowdale, Ontario: Canadian Forces Personnel Applied Research Unit.

A study of the utility of the Personality Research Form (PRF) as a predictor of training success. The PRF is described as a construct-oriented self-report inventory, based on Murray's list of needs. A general review of the literature dealing with the PRF is provided. Validity data are provided for tests comprising the existing selection battery and scales from the PRF.

SAMPLE: N = 102; Canada; Military

CRITERION: Pass/Fail; Training

PREDICTOR	CRITERION CORRELATION
Pilot Stanine Score	.28
Personality Research Form	
Vocational Preference Scale	
Aggressive Leadership	.22
Human Relations	.07
Technically-Oriented Achievement	-.14
Aesthetic-Intellectual	.06

146. Jones, A. (1983). A survey of military pilot selection procedures in ten countries (SP(N) Report R56). London, England: Senior Psychologist (Naval), Ministry of Defence.

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147. Jones, A. (1988). A survey of United Kingdom armed services computer-based aptitude testing: a report prepared for NATO Panel VIII Research Study Group 15 (Report R111). London, England: Senior Psychologist (Naval), Ministry of Defence.

(The distribution of this document has been restricted by the releasing agency. No data may be abstracted for public release. Consult the releasing agency for further information.)

148. Jones, A., & Abram, M. (1989). MICROPAT Databook: First edition. (SP-N Report TR 234). London England: Senior Psychologist (Naval), Ministry of Defence.

This report provides extensive normative data on the tests comprising the MICROPAT test battery. Validity coefficients for basic fixed wing, basic rotary wing, and advanced rotary wing training are also given.

(The distribution of this document has been restricted by the releasing agency. No data may be abstracted for public release. Consult the releasing agency for further information.)

149. Jones, D. H., & McAnulty, D. M. (1984). An examination of ability requirements for various rotary wing missions. Proceedings of the Human Factors Society 28th Annual Meeting. 361-365.

An analysis of the ability requirements of four helicopter pilot mission types: cargo, utility, scout, and attack. Using the ability rating scale procedure of Fleishman, the requirements of approximately 25 different abilities for the four missions were estimated by subject matter experts (experienced pilots). While not specifically concerned with selection, these data are applicable to aircrew classification. No validity data are given.

150. Kantor, J. E., (1984). Israeli pilot selection and training. (Unpublished manuscript) Brooks Air Force Base, TX: Personnel Research Division, Air Force Human Resources Laboratory.

(The distribution of this document has been restricted by the releasing agency. No data may be abstracted for public release. Consult the releasing agency for further information.)

151. Kantor, J. E., & Bordelon, V. P. (1985). The USAF pilot selection and classification research program. Aviation, Space and Environmental Medicine, 56, 258-261.

Briefly describes the Air Force research program centering upon use of the psychomotor coordination tests and the Basic Attributes Test battery. Results are reported for a sample of 1,622 cases who attended pilot training from 1981 to 1983. [Caution on use in meta analysis -- these data overlap those reported in other, earlier studies (i.e., Hunter, 1982)] No zero-order validity coefficients are reported.

152. Kantor, J. E., & Carretta, T. R. (1988). Aircrew selection systems. Aviation, Space and Environmental Medicine, 59, 32-38.

Reviews the development of the Portable Basic Attributes (PORTA-BAT) System and describes the hardware and software configuration. The tests comprising the PORTA-BAT are listed. Reports on the cumulative results of work leading to the development of the pilot candidate selection method, currently in use by the Air Force, which combines scores from the Air Force Officer Qualifying Test with psychomotor coordination test scores. Preliminary results on development of a pilot classification algorithm for specialized undergraduate pilot training are reported.

153. King, J. E. (1945). Relation of aptitude tests to success of Negro trainees in elementary pilot training (Research Bulletin 45-52). Tuskegee Army Air Field: Office of the Surgeon, Headquarters Army Air Forces Training Command.

Provided some evidence of minority group validities for the World War II aircrew selection battery. Examines the validities of the aircrew selection battery for the prediction of success/failure for a group of 688 Negro pilot trainees in a study conducted at the Tuskegee Army Air Field.

SAMPLE: N = 688; United States; Army Air Corps

CRITERION: Pass/Fail; Training

PREDICTOR	CRITERION CORRELATION
Pilot Stanine	.23
General Information Test	.23
Instrument Comprehension Test	.27

154. Knight, S. (1978). Validation of RAF pilot selection measures (Note No. 7/78). London, England: Science 3 (Royal Air Force), Ministry of Defence.

An analysis of the tests being used operationally for selection of Royal Air Force pilots. Biserial correlations were computed between predictor scores and a pass/fail criterion in initial basic flying training. Results were analyzed using multiple regression (with a cross-validation sample) to examine improvements to weighting algorithm for construction of a pilot index.

SAMPLE: N = 183; United Kingdom; Royal Air Force

CRITERION: Pass/Fail; Training

PREDICTOR	CRITERION CORRELATION Corrected Biserial r
General Intelligence	.04
Mathematics - General	.13
Mathematics - Table Reading	.14
Mechanical Comprehension	.04
Instrument Comprehension	.30
Sensory Motor Apparatus	.21
Control of Velocity Test	.18
Aircrew Film Test	.12
Pilot Index	.25
Navigator Index	.08

155. Koonce, J. M. (1981). Validation of a proposed pilot trainee selection system. In R. S. Jensen (Ed.), Proceedings of the First Symposium on Aviation Psychology (Technical Report APL-1-81). Columbus, OH: Aviation Psychology Laboratory of the Ohio State University.

Evaluated the validity of the Air Force Officer Qualifying Test and the Complex Coordination Test for the selection of pilots from the Air Force Academy

SAMPLE: N = 200; United States; Air Force Academy Cadets

CRITERION: Pass/Fail; Training

PREDICTOR	CRITERION CORRELATION Class of 1978	Class of 1979
Air Force Officer Qualifying Test Pilot Composite	.15	.26
Complex Coordination Test	-.04	-.09

156. Kragh, U. (1960). The defense mechanism test: A new method for diagnosis and personnel selection. Journal of Applied Psychology, 44, 303-309.

Describes a procedure titled the Defence Mechanism Test in which a series of TAT-like pictures are (at first) subliminally exposed to the subject, with exposure time gradually increasing until complete recognition of the scene is achieved. Multiple measures obtained during the procedure are described, along with results from the administration of the procedures to multiple, small samples of Swedish aviation cadets. Validity data are provided.

157. Krumboltz, J. D., & Christal, R. E. (1957). Relative pilot aptitude and success in primary pilot training. Journal of Applied Psychology, 41, 409-413.

Evaluated the validity of a metric based upon each student's relative pilot aptitude (RPA) score. This RPA score was generated by comparing the student's aptitude measures (pilot stanine) to those of all other students in his class. The biserial validity of the RPA scores against a pass/fail criterion was found to be superior to that of the pilot stanine (.412 versus .348).

158. Lane, G. G. (1947). Studies in pilot selection: I. The prediction of success in learning to fly light aircraft. Psychological Monographs, 61, 1-17.

Assessed the relationships between a number of performance criteria and several predictor measures. Subjects were students attending, or recently graduated from college. The correlations reported below are between the predictors and the Civil Aeronautics Administration Overall Score.

SAMPLE: N = 37; United States; Civilian

CRITERION: Performance Score; Training

PREDICTOR	CRITERION CORRELATION
Otis Quick Scoring Test	-.141
Ohio State Psychological Examination	-.016
Test of Aviation Information	.351
Biographical Inventory	.302
Mechanical Comprehension	.315
Desire-to-Fly	.414
Mashburn Serial Reaction Test	.053
Two-Hand Coordination Test	-.016
Judgement-Reaction Test	.155

159. LeMaster, W. D., & Gray, T. H. (1974). Ground training devices in job sample approach to UPT selection and screening (AFHRL-TR-74-86). Williams Air Force Base, AZ: Flying Training Division, Air Force Human Resources Laboratory.

Investigated the use of operational flight simulators as selection instruments. They used an instrument trainer (modeled upon the T-37 aircraft), in a study in which participation in the study (which provided extensive training in the instrument simulator) replaced the T-41 light plane screening. A sample of 128 students participated in the study, and three classes of objective measures of piloting performance were obtained: (1) Measures of aircraft flight parameters (i.e., airspeed, altitude, etc.); (2) Measures of systems management ability (attending to side-task problems); and, (3) Measures of flying procedures compliance (power settings, navigation procedures, etc.). The 25 tests comprising these three classes of measures were composed of 342 items. In order to reduce the data set, these items were coalesced into measures in three categories: (1) Maneuvers, (2) Activities, and (3) Procedures. Multiple correlations of the 30 variables with the Overall T-37 Phase Grade and T-37 Pass/Fail criteria, yielded values of.76 and .45, respectively. Both of those multiple correlations are significant at $p < .01$.

SAMPLE: N = 128; United States; Air Force

CRITERION: Pass/Fail & Performance Scores; Training

PREDICTOR	CRITERION CORRELATION			
	Check Ride	Instrument	Overall	Pass/ Fail
Maneuver				
Straight-and-Level Flight	-.35	-.28	-.52	-.16
Pitch Control Maneuvers	-.37	-.30	-.41	-.19
Change Airspeed	-.33	-.43	-.43	-.20
Climbs & Descents	-.44	-.34	-.52	-.21
Turns	-.03	-.02	-.07	-.14
Rate Climb or Descent	-.37	-.17	-.47	.11
Complex Turn	-.53	-.49	-.61	-.24
Instrument Take Off	-.23	-.20	-.34	-.21
Vertical "S" Alpha	-.35	-.14	-.46	-.20
Vertical "S" Delta	-.27	-.20	-.38	-.16
Steep Turns	-.35	-.25	-.43	-.23
Stressed - Straight & Le	-.30	-.30	-.41	-.20
Stressed - Alt./Airspeed	-.32	-.28	-.36	-.06
Stressed - Complex Turn	-.21	-.21	-.35	-.17
Stressed - Rate Climb/De	-.36	-.35	-.37	-.07

Activity				
Frequency Response Time - Practice	-.20	.17	.25	-.02
Single Light Position Response Time - Practice	-.28	-.11	-.35	-.06
Double Light Position Response Time - Practice One Item	-.11	-.09	-.13	-.03
Frequency Response Time	-.17	.00	-.17	-.04
Single Light Position Response Time	-.23	.01	-.25	-.08
Double Light Position Response Time	-.34	-.12	-.32	-.13
Procedure				
Communications	.17	.03	.24	.11
Power Setting	-.03	.01	.05	.18
Turn Direction	-.10	-.07	-.01	.19
Roll-Out Accuracy - 30 Deg	.34	.25	.41	.17
Roll-Out - 30 Deg. Bank Tu	.26	.12	.29	.04
Wingover Roll Rate	.10	.13	.08	.02
Roll-Out Accuracy - 60 Deg	.08	.16	.06	.08
Wingover	.30	.19	.31	.15
Advanced Instrument Proced	.09	.11	.19	.15

160. Levine, A. S., & Tupes, E. C. (1952). Postwar research in pilot selection and classification. Journal of Applied Psychology, 36, 157-160.

Review of research conducted immediately following World War II. Reports research on the validity of the existing tests, which was around .57 - .60 for the Air Force stanine. Reports that an Attitude Survey was "...the best single predictor of motivational elimination yet investigated...." with a biserial correlation of around 0.45 for that category of elimination. The Attitude Survey, along with a Biographical Inventory, General Information Test, Practical Judgement Test, and Biographical Data Blank yielded a multiple correlation of 0.62 with a Graduation versus Flying Deficiency Elimination criterion (N=430 to 583).

161. Lewis, G. W., & Rimland, B. (1979). Hemispheric asymmetry as related to pilot and radar intercept officer performance (Technical Report 79-13). San Diego, CA: Navy Personnel Research and Development Center.

Compared visual evoked potentials (VEP) of US Navy pilots and radar intercept officers. Significant differences were found between the two groups. Implications of the results for improving selection and classification are discussed. No validity data are given.

162. Lidderdale, I. G. (1976). The primary flying grading trial interim report No. 2. RAF Brampton, England: Research Branch, Headquarters Command, Royal Air Force, Ministry of Defence.

Evaluated the utility of a short flying course conducted in a light aircraft as a selection procedures for entry into RAF flying training. Flight checks were performed at 9 and at 14 hours of training using a standardized grading system and these grades correlated with a pass/fail criterion.

SAMPLE: N = 53; United Kingdom; Royal Air Force

CRITERION: Pass/Fail; Training

PREDICTOR	CRITERION CORRELATION
Light-Plane Flying Grade - 9 hour check	.78
Light-Plane Flying Grade - 14 hour check	.91
Overall Grade (Instructor Evaluation plus Flying Grades)	.93

163. Long, G. E., & Varney, N. C. (1975). Automated pilot aptitude measurement system (APAMS) (AFHRL-TR-75-58). Lackland Air Force Base, TX: Personnel Research Division, Air Force Human Resources Laboratory.

This report describes the development of an Automated Pilot Aptitude Measurement System (APAMS), which consisted of two GAT-1 simulators connected to a single minicomputer. In this system an automated instructional sequence was employed, with no human instructor required. A five-hour syllabus of instruction, administered over a 10-day period, was delivered using computer-controlled film/sound strips in a projector mounted inside the cockpit of the GAT-1. This syllabus covered the function and movements of all the instruments and controls, and worked the students through a progressively more involved series of flight maneuvers, beginning with straight-and-level flight, through climbs and descents, turns, and eventually, take-off and landing. Feedback on performance on individual maneuvers was provided via a computer display mounted the nose of the simulator, and all maneuvers were performed without outside visual references. Automatic recording of relevant flight parameters (i.e., heading, bank angle, altitude, etc.) was performed by the minicomputer.

A factor-analytic approach was used to reduce the large amount of data obtained from the study into a more manageable format. Correlations are reported ranging from

0.25 to 0.50 between various UPT criteria and the factor scores obtained from the APAMS.

164. Lyon, V. W. (1951). Pilot candidate selection research project. Journal of Aviation Medicine, 22, 152-155.

Describes in very general terms a research project in which over 2,000 Navy midshipmen were administered a comprehensive battery of 35 paper-and-pencil tests and 19 psychomotor tests during pre-flight. The report indicates that 17 of the 35 paper-and-pencil tests and 17 of the 19 psychomotor tests correlated significantly with a pass/fail criterion. However, no specific validity data are given.

165. Majesty, M. S. (1973). Centralized selection system for Air Force pilots. Proceedings of the 15th Annual Meeting of the Military Testing Association.

Describes the operational selection system and an experimental selection system under evaluation. The operational system included a paper-and-pencil test (Air Force Officer Qualifying Test) and a Flight Screening Program (light-plane). The experimental system included: group ability tests; altitude chamber test; Strong Vocational INterest Blank; flight simulator test; and, psychomotor coordination tests. No validity data are given.

166. Manning, R. V., & Yellowless, L. A. (1949). RCAF aircrew selection methods. Journal of Aviation Medicine, 20, 58-61.

A description of the process through which pilots are selected for the Royal Canadian Air Force. Initial screening is conducted at dispersed recruiting stations with a paper-and-pencil test and a controlled interview. Applicants surviving this first screening are sent to a centralized examination point for additional tests, including: medical examination; acceleration (resistance to high g loading; decompression; vision; psychiatric interview; aptitude tests (written); visual link test; and, assessment of officer qualities. No validity data are provided.

167. Marco, R. A., Bull, R. F., Vidmar, R. L., & Shipley, B. D. (1979). Rotary wing proficiency-based aviator selection system (PASS) (Technical Report TR-79-A2). Fort Rucker, AL: Army Research Institute.

Describes the development of a job-sample testing system for Army helicopter pilots, modeled after the Automated Pilot Aptitude Measurement System (APAMS; Long & Varney, 1975). This system used a helicopter simulator (UH-1FS) and a modified version of the APAMS syllabus of instruction. This report describes only the development of the system, to include all instructions given to students. No validity data are given.

168. Mashburn, N. C. (1934a). The complex coordinator as a performance test in the selection of military flying personnel. Journal of Aviation Medicine, 5, 145-154.

A description of the development and evaluation of a "Complex Coordinator" (development is attributed to L. J. O'Rourke) which measured the speed of movement of aircraft-like controls while aligning rows of lights. A graph depicting the relationship between scores on the device and training outcome (pass/fail) for a group of 1,394 students is provided. Although the relationship is apparently positive and significant, no validity correlations are given.

169. Mashburn, N. C. (1934b). Mashburn automatic serial action apparatus for detecting flying Aptitude. Journal of Aviation Medicine, 5, 155-160.

A description of the Mashburn apparatus. Apparently modeled after the Complex Coordinator, the principal difference seems to be in the requirement to simultaneously align three pairs of lights using the aircraft-like controls. The apparatus is described in detail; however no validity data are given.

170. McGregor, K. H. (1977). RNZAF Aircrew selection: an interim report (DPU Report 6/77). Wellington, New Zealand: Defence Psychology Unit, Royal New Zealand Air Force.

Describes the tests which are used in production of the Pilot Actuarial Success Probability (PASP) index. These tests include measures of: general and reasoning mathematics; instrument comprehension; and psychomotor coordination. Although graphs are included which indicate a generally positive relationship between scores on these measures and training outcome, no validity coefficients are provided.

171. McGregor, K. H., & Baker, A. F. H. (1978). A revised system for pilot selection (DPU Report 5/78). Wellington, New Zealand: Defence Psychology Unit Royal New Zealand Air Force.

A discussion of possible reasons for the apparent failure of the Pilot Actuarial Success Probability (PASP) index to effectively screen pilot applicants. Reasons explored include: misinterpretation of the statistical results; misapplication of the index; unsuitability of the index; and, incompatibility of the index. Proposals for modification of the selection system are included. No specific validity data for the tests comprising the index are provided, however an overall correlation of approximately .65 between the index and training pass/fail is claimed.

172. McGrevy, D. F., & Valentine, L. D. (1974). Validation of two aircrew psychomotor tests (AFHRL-TR-74-4). Lackland Air Force Base, TX: Personnel Research Division, Air Force Human Resources Laboratory.

Describes two studies in which scores from computer-based versions of the Two-Hand Coordination Test and Complex Coordination Test were correlated with training pass/fail. The two tests are scored in x-axis and y-axis displacement (error) from a cursor to a target. The generated score given below is the straight-line distance from the cursor to the target, computed according to the Pathagorian formula.

SAMPLE: N = 121 (A), 92 (B); United States; Air Force

CRITERION: Pass/Fail; Training

PREDICTOR	CRITERION CORRELATION SAMPLE A	B
Two-Hand Coordination Test		
Generated - Minute 1	-.22	
Generated - Minute 2	-.19	
Generated - Minute 3	-.06	
Generated - Minute 4	-.12	
Generated - Minute 5	-.06	
Complex Coordination Test		
Generated - Minute 1	-.21	-.07
Generated - Minute 2	-.27	-.33
Generated - Minute 3	-.34	-.24
Generated - Minute 4	-.35	-.22
Generated - Minute 5	-.31	-.27

173. McLaurin, W. A., & Passey, G. E. (1967). Critical behavioral functions and recommended tests for selection of aircrew members (ER-8200). Lockheed-Georgia Corp.

Describes an extensive review of perceptual and motor ability testing and a suggested test battery for the selection of aerospace ground personnel. While oriented toward the selection of enlisted technical personnel, the battery contained many tests which were potentially useful in aircrew selection.

174. McMullen, R. L., & Eastman, R. F. (1973). The current predictive validity of the flight aptitude selection tests. Proceedings of the 17th Annual Meeting of the Military Testing Association.

Describes the battery of tests used for selection of Warrant and Commissioned Officer aviators for the US Army. The Flight Aptitude Selection Tests (FAST) encompassed four

content areas: (1) Personality and Leadership,(2) Spatial Aptitude, (3) Mechanical Aptitude and Knowledge, and (4) Aviation Information. The study reported that this battery yields correlations of .38 and .44 between training outcome (pass/fail) and the Warrant Officer and Commissioned Officer FAST composite scores, respectively.

175. Melton, A. W. (Ed.) (1947). Army Air Forces Aviation Psychology Research Reports: Apparatus Tests (Report No. 4). Washington, DC: U. S. Government Printing Office.

One of a series of United States Army Air Force reports (commonly known as the "blue book series") which document research efforts conducted during World War II. This report describes the paper-and-pencil tests used for aircrew selection and classification. Typical correlations between a pass versus fail in training criterion and several of the tests are given below:

SAMPLE: N > 1,000; United States; Army Air Corps

CRITERION: Pass/Fail; Training

PREDICTOR	CRITERION CORRELATION
General Information	.51
AAF Qualifying Examination	.50
Instrument Comprehension	.48
Rudder Control	.42
Mechanical Principles	.43
Dial & Table Reading	.40
Complex Coordination (Apparatus Test)	.42
Discrimination Reaction Time (Apparatus Test)	.42
Spatial Orientation II	.40
Two-Hand Coordination (Apparatus Test)	.36

176. Melton, R. S. (1954). Studies in the evaluation of the personality characteristics of successful Naval aviators. Journal of Aviation Medicine, 25, 600-604.

Reports on a study of the Minnesota Multiphasic Personality Inventory (MMPI). No significant correlations were noted between flying criteria and individual scales from the MMPI. However, one clustering of flight failures was found -- those individuals with low scores (T < 40) on Hysteria (Hy), Masculinity- Femininity (Mf), and the Hypomania (Ma). A discriminant function computed on the failure cluster and the opposition cluster (High Hy, Mf, Ma) generated a variate which correlated 0.26 with the pass/fail criterion (N=935).

177. Meyer, R. P., Laveson, J. I., Paper, G. L., & Edwards, B. J. (1978). Development and application of a task taxonomy for tactical flying (AFHRL-TR-78-42(I)). Williams Air Force Base, AZ: Flying Training Division, Air Force Human Resources Laboratory.

This and the other reports by Meyer, et. al., describe an extensive effort to develop task taxonomies for pilot training and tactical flying. Detailed task analyses of many pilot functions are provided using a behavioral stimulus-organism-response paradigm. Discussions included in these reports are concerned primarily with the implications for pilot training; however the results should also be applicable to the specification of abilities to be assessed in a comprehensive pilot selection battery.

178. Meyer, R. P., Laveson, J. I., Weissman, N. S., & Eddowes, E. E. (1974a). Behavioral taxonomy of undergraduate pilot training tasks and skills: executive summary (AFHRL-TR-74-33(I)). Williams Air Force Base, AZ: Flying Training Division, Air Force Human Resources Laboratory.

179. Meyer, R. P., Laveson, J. I., Weissman, N. S., & Eddowes, E. E. (1974b). Behavioral taxonomy of undergraduate pilot training tasks and skills: surface task analysis, taxonomy structure, classification rules, and validation plan (AFHRL-TR-74-33(II)). Williams Air Force Base, AZ: Flying Training Division, Air Force Human Resources Laboratory.

180. Meyer, R. P., Laveson, J. I., Weissman, N. S., & Eddowes, E. E. (1974c). Behavioral taxonomy of undergraduate pilot training tasks and skills: taxonomy refinement, validation and operations (AFHRL-TR-74-33(III)). Williams Air Force Base, AZ: Flying Training Division, Air Force Human Resources Laboratory.

181. Meyer, R. P., Laveson, J. I., Weissman, N. S., & Eddowes, E. E. (1974d). Behavioral taxonomy of undergraduate pilot training tasks and skills: guidelines and examples for taxonomy application in flying training research (AFHRL-TR-74-33(IV)). Williams Air Force Base, AZ: Flying Training Division, Air Force Human Resources Laboratory.

182. Michael, W. B. (1947). An investigation of the contributions of factors to tests and to their predictive value in two Army Air Force pilot populations. American Psychologist, 2, 417-418.

A brief report of a study in which factor analyses were conducted on the selection battery tests for two groups--West Point cadets (N=815) and Negro cadets (N=356). The analyses resulted in similar results, with the exception of an additional factor (kinesthesis) being identified for the Negro sample. The three factors for each group which correlated highest with training success were pilot

interest, psychomotor coordination, and spatial relations for the West Point sample, and kinesthesis, perceptual speed and spatial relations for the Negro sample. Factors of numerical and verbal ability were not significant. No validity correlations are provided.

183. Miller, J. T., Eschenbrenner, A. J., Marco, R. A., & Dohme, J. A. (1981). Mission track selection process for the Army initial entry rotary wing flight training program. St. Louis, MO: McDonnel Douglas Astronautics Co.

Questionnaires and interviews were used to identify the abilities and attributes required for successful performance of tasks for each of four helicopter mission areas: scout, attack, utility, and cargo. Based upon the initial results, a test battery consisting of six paper-and-pencil tests measuring various perceptual and cognitive abilities was developed and administered to entering students. In addition to test scores, biographical data and training course performance measures were also collected. Significant multiple correlations were obtained with these data and performance in the scout, utility, and attack training courses. Insufficient data were available for the cargo course. In addition to the results of factor analyses, intercorrelation matrices for each of the sub-groups are given which contain validities for certain training performance measures (not including pass/fail). The data given below are for two performance measures for the warrant officer utility helicopter pilots.

SAMPLE: N = 128; United States: Army Helicopter

CRITERION: Performance Measures; Training

PREDICTOR	CRITERION CORRELATION	
	Primary Stage Grade	Contact Stage Grade
Age	-.19	-.25
Education	-.17	-.17
Flight Aptitude Selection Test		
Comprehensive Score	.09	.08
ASVAB		
General Technical Scale	.03	-.00
General Mechanical	.08	.08
Electrical	.08	.06
Clerical	.02	.07
Mechanical Maintenance	.02	.00
Space Thinking (Flags) Test	.17	-.08
Closure Flexibility	-.01	.00
Press Test		
First Stage	.10	.02
Second Stage	-.02	-.04
Third Stage	.14	.12
Ship Destination Test	.16	.07

Space Visualization Test	.14	.03
Leadership Ability Evaluation Test		
Laissez-Faire Score	-.18	-.08
Democratic-Cooperative Score	.14	.16
Autocratic-Aggressive Score	-.00	-.13
Autocratic-Submissive Score	-.09	-.13
Overall Weighted Score	-.15	-.11

184. Miller, R. E. (1974). Optimal assignment of Air Force pilots (AFHRL-TR-73-59). Lackland Air Force Base, TX: Personnel Research Division, Air Force Human Resources Laboratory.

Describes the results of a study using multidiscriminant analysis to identify assignments to one of three pilot specialties. Ten test scores and training grades were used to classify new pilots as optimally assignable to transport, fighter, or reconnaissance missions.

185. Missenard, A. R., Gelly, R., Duffaut, M., & Leagre, G. (1964). An experiment in psychiatric selection of flying personnel. In A. Cassie, S. D. Fokkema, & J. B. Parry (Eds.), Aviation Psychology. The Hague: Mouton.

Describes a study in which clinical examinations and standardized tests (taken in small groups) were evaluated as predictors of pilot training performance. The aim of the study was to demonstrate equivalence of the two methods so as to enable the utilization of psychiatric selection measures without the need for highly trained examiners. The findings indicated that such an approach was not feasible. The impact of test reliability, motivation of subjects, and other factors on the results are discussed. No predictive validities are given.

186. Mixon, T. R., & Moroney, W. F. (1982). An annotated bibliography of objective pilot performance measures. (Technical Report: NAVTRAEQUIPCEN IH-330). Orlando, FL: Naval Training Equipment Center.

Although it does not specifically deal with aircrew selection, this reference in included because of its complete coverage of a topic closely related to selection issues and the validation of selection instruments on pilot performance measures. The report includes references to 362 articles.

187. Mullins, C. J., & Cox, J. A. (1960). Evaluation of the AFROTC flight instruction program (WADD-TN-60-44). Lackland Air Force Base, TX: Personnel Laboratory, Wright Air Development Division.

This study reports on an evaluation of an experimental flying program for Reserve Officer Training Corps (ROTC) university students. While the study was not specifically

concerned with using the flying program as a selection device, it was noted that those students who received the flying program before entry into training had a significantly lower failure rate (14% as compared to 21% for those students who did not receive the training).

188. Mullins, C. J., Keeth, J. B., & Riederich, L. D. (1968). Selection of foreign students for training in the United States Air Force (AFHRL-TR-68-111). Lackland Air Force Base, TX: Personnel Research Division, Air Force Human Resource Laboratory.

In addition to training United States service personnel, the U. S. Air Force also trains many foreign students. This report describes a study of 120 foreign students entering USAF pilot training, in which a battery of 24 paper-and-pencil tests (and 2 psychomotor tests) were evaluated. All the paper-and-pencil tests were "language-free", except for the instructions, which were translated into 10 languages.

SAMPLE: N = 120; Mixed, Non-United States; Military

CRITERION: Pass/Fail; Training

PREDICTOR	CRITERION CORRELATION
Subtraction	-.05
Tools	.28
Patterns	.00
Plane Figures	.27
Number Series	.13
Division	-.21
Wheels	.34
Designs	-.06
Figure Analogies	.16
Number Reversal	-.07
Table Reading	.14
Number Size	-.07
Paired Letters	.02
Dot Estimation	.05
Maze	.09
Precision Counting	-.08
Large Tapping	.03
Trace Tapping - I	-.04
Trace Tapping - II	-.08
Crossing	-.11
Line Control	-.10
Tracing	-.03
Signal Reaction	.13

189. Myers, D. C., Schemmer, F. M., & Fleishman, E. A. (1983). Analysis of computer interactive tests for assigning helicopter pilots to different missions (Technical Report R83-8). Bethesda, MD: Advanced Research Resources Organization.

Used a taxonomic approach to conduct job analysis linking pilot tasks to ability requirement for specific mission tracks. Task battery of ten tests was then developed to assess most important abilities. Descriptive statistics and intercorrelations of the test scores are given. A plan for follow-on research is provided. No validity data are included.

190. Neuman, T. (unknown). Perceptual defense organisation as a predictor of the pilot's adaptive behaviour in military flying. Unpublished manuscript. Institute of Military Psychology, Stockholm, Sweden.

Provides a description of the Defence Mechanism Test (DMT) and its rationale for development based upon considerations of perceptual defence organizations. The scoring method and the scale generation procedures are described. Data are presented which indicate an inter-rater reliability of around .80 for two trained raters. Validity with a flying training pass/fail criterion is claimed to range from .35 to .60, with the validity increasing over time and reaching a maximum after three years. Sample sizes and other details are not provided.

191. Neuman, T. (1982). Influence of DMT on economy of training and flight safety (DRIC-T-7203). Stockholm, Sweden: Institute of Military Psychology.

A somewhat more detailed description of the Defence Mechanism Test (DMT) and its rationale for use with pilots than is provided in the previously cited report. The DMT was introduced into the pilot selection system for Sweden in 1970, and was revised in 1975 and 1978. Analyses of DMT results for pilots involved in "pilot error" accidents indicates a relationship between the DMT scores and probability of being involved in an accident. Analyses are presented of various groups of pilots and types of accidents.

192. Norman, R. D. (1947). A comparison of earlier and later success in Naval Aviation Training. Journal of Applied Psychology, 31, 511-518.

Compared the early academic (ground school courses) scores of 200 attritted naval aviation cadets with 200 non-attrits. Graduates were generally superior to failures in terms of number of courses passed and performance in the courses.

193. North, R. A., & Gopher, D. (1974). Basic attention measures as predictors of success in flight training (Technical Report ARL-74-14). Urbana-Champaign, IL: Aviation Research Laboratory, University of Illinois at Urbana-Champaign.

A performance testing system was developed which included a digit-processing reaction time task and a one-dimensional compensatory tracking task. Separate and simultaneous performance on these tasks were compared for a group of 11 flight instructors and 32 student pilots. Instructors were generally found to be superior to student pilots. Among the student pilots, single-task measures did not discriminate between students who were rated as high- or low-potential prior to their flight certification checkride. However, several of the dual-task measures did reliably discriminate between the two groups.

SAMPLE: N = 32; United States; Civilian

CRITERION: Instructor Evaluation; Training

PREDICTOR	CRITERION CORRELATION
Dual-Task Test	
Tracking manageability	.40
Slope of Tracking Score	.57
Slope of Digit Cancelling Score	.40

194. North, R. A., & Gopher, D. (1976). Measures of attention as predictors of flight performance. Human Factors, 18, 1-4.

This report generally duplicates that cited as North & Gopher (1974).

195. North, R. A., & Griffin, G. R. (1977). Aviator selection 1919-1977 (Special Report 77-2). Pensacola, FL: Naval Aerospace Medical Research Laboratory.

A narrative review of research on US Navy aviator selection. The problems associated with identification of relevant abilities to be assessed and the selection or development of suitable criteria for validation are discussed. The report cites 145 references.

196. Owens, J. M., & Goodman, L. S. (1983). Navy aviation selection and classification research. Paper presented at the Eleventh Meeting of the Department of Defense Human Factors Engineering Technical Advisory Group, Aberdeen Proving Grounds, MD.

A description of the US Navy DYNASTIES (Dynamic Naval Aviator Selection Test & Evaluation System), which included the: complex coordination test; dichotic listening test; divided attention test; and, brief vestibular disorientation

test. A description of the tests comprising the Aircrew Cognitive Evaluation System (ACES) is also included. No validity data are given for the ACES tests, however.

SAMPLE: N = 294; United States; Navy

CRITERION: Pass/Fail; Training

PREDICTOR	CRITERION CORRELATION
Complex Coordination Test - 1	-.12
Complex Coordination Test - 2	-.27
Complex Coordination Test - 3	-.18
Complex Coordination Test - 4	-.17
Dichotic Listening Test - 1	.02
Dichotic Listening Test - 2	-.09
Divided Attention Test	
Number Correct	.08
Root Mean Square	.00
Brief Vestibular Disorientation Test	
Static Correct	.08
Rotating Correct	.05
Academic Qualification Test	.01
Flight Aptitude Rating	.05

197. Parry, J. B. (1947). The selection and classification of RAF aircrew. Occupational Psychology, 21, 158-167.

This report describes the research on aircrew selection conducted by the Royal Air Force during World War II. It cites the contributions of F. C. Bartlett in the development of a General Intelligence Test, an Elementary Mathematical Test, and a Pilot Coordination Test. The report describes the policy used by the wartime selection boards with regard to the use of test results and indicates that although utilization of results was irregular, the introduction of the tests did advance the selection process, if only on a modest scale. Because of the increasing demand for pilots, in 1944 a two-day testing program was instituted with 18 paper-and-pencil and 5 apparatus tests. Individual validity coefficients for these tests are not provided, however some validity figures for the combined category indices are given. These correlations were .262 (.474 corrected) and .285 (.473 corrected) between the indices and pilot grading (initial training performance) and initial ground training, respectively.

198. Parry, J. B. (1966). The production of flying personnel. In W. H. Jessup (Ed.), Manpower Planning. New York: American Elsevier.

Discussion of flying training and selection, oriented toward the experiences of the Royal Air Force. Problems of unreliability of the training criteria and its impact on observable validity correlations are described.

199. Passey, G. E., & McLaurin, W. A. (1966). Perceptual-psychomotor tests in aircrew selection: Historical review and advanced concepts (PRL-TR-66-4). Lackland Air Force Base, TX: Personnel Research Laboratory, Aerospace Medical Division.

This report describes an extensive review of perceptual-psychomotor ability testing for selection of aircrew members, primarily after World War II. A list of abilities recommended for inclusion in a comprehensive selection battery is provided, along with an annotated bibliography containing 72 references.

200. Patton, D. M. (1980). RAAF aircrew (pilot) selection: A follow-up study on the relationship of psychological test scores and other variables to performance on pilot courses nos. 100-108 (Research Note 7/80). Canberra, Australia: Department of Defence (Air Force Office).

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201. Patton, D. M. (1981). RAAF academy selection: The relationship of psychological test scores to performance on pilot course for a sample of RAAF academy graduates (Research Note 1/81). Canberra, Australia: Department of Defence (Air Force Office).

(The distribution of this document has been restricted by the releasing agency. No data may be abstracted for public release. Consult the releasing agency for further information.)

202. Peterson, F. E., Booth, R. F., Lane, N. E., & Ambler, R. K. (1967). Predicting success in Naval flight officer training (NAMI-996). Pensacola, FL: Naval Aerospace Medical Center.

A study of the correlation between selection test battery scores and training success for Naval flight officers (navigators, radar intercept officers, etc.).

SAMPLE: N = 958; United States; Navy Flight Officers (non-pilots)

CRITERION: Pass/Fail; Training

PREDICTOR	CRITERION CORRELATION
Aviation Qualification Test (Academic Ability)	.34
Mechanical Comprehension	.35
Spatial Apperception	.20
Biographical Inventory	.15

203. Prestrude, A. M. (1987). Dynamic visual acuity in the selection of the aviator. In R. S. Jensen (Ed), Proceedings of the Fourth International Symposium on Aviation Psychology (April 1987). Ohio State University: Aviation Psychology Laboratory, OSU.

Describes the characteristics of dynamic visual acuity (DVA) which is applied to objects moving across the visual field, as contrasted with static visual acuity in which the perceived object is motionless with respect to the observer. Reviews studies and presents correlations which indicate that individual differences in DVA could be a partial determinant of flying performance and a contributor to aviation safety.

204. Rasmussen, E. T. (1964). A fundamental point of view for the psychological examination and selection of pilot trainees for the Royal Danish Air Force. In A. Cassie, S. D. Fokkema, & J. B. Parry (Eds.), Aviation Psychology. The Hague: Mouton.

Describes the psychological examination of pilot trainees for the Royal Danish Air Force. Two general types of tests are distinguished: psychotechnical tests (ability) and characterological (personality). Various tests of both types are described, however no validity data for the measures are given.

205. Rauch, M. (1980). Development of selection simulators in the German military aviation psychology. Proceedings of the 22nd Annual Meeting of the Military Testing Association.

This report describes research projects in the (West) German Armed Forces to develop a job-sample testing system similar to that described by Long & Varney (1975). The existing aircrew selection system is described as consisting of: paper-and-pencil tests; examination of complex functions (e.g. psychomotor functions); and, screening. The third element (screening) is further described as consisting of three parts: psychological screening; theoretical screening (knowledge of aeronautical theory, meteorology, etc.); and, practical (light-plane) screening. No validity data are given.

206. Razran, G. H. S., & Brown, H. C. (1941). Aviation. Psychological Bulletin, 38, 322-330.

A very brief review of aviation psychology, principally dealing with issues of personnel selection. The report cites 92 references. No validity data are given.

207. Reinhardt, R. F. (1970). The outstanding jet pilot. American journal of psychiatry, 127, 732-736.

Studied 105 Navy fighter pilots who were rated as outstanding by their commanding officers. The pilots were interviewed by a psychiatrist and completed the Maudsley Personality Inventory (MPI), Edwards Personal Preference Schedule (EPPS), and MMPI. Results were compared against the general population and against a group of 70 aviators who had been grounded or had surrendered their wings. The outstanding pilots generally were firstborn, had fathers who were in the Navy, were less likely to have lost their fathers up through college, and had fewer citations for reckless driving than the failure group. Some significant differences between the outstanding pilot group and the American college normative group on the EPPS and MPI were also found.

208. Rippon, T. S., & Manuel, E. G. (1918). The essential characteristics of successful and unsuccessful aviators. The Lancet, September, 411-415.

This largely anecdotal report from World War I describes the successful pilot as a high-spirited, happy-go-lucky sportsman who "...seldom takes his work seriously but looks upon 'Hun-strafing' as a great game..." and returns after a day's flying to the theater, music, dancing and cards.

209. Roach, B. W. (1983). Utility of the Air Force Qualifying Test in selecting pilots. Unpublished manuscript. Brooks Air Force Base, TX: Manpower and Personnel Division, Air Force Human Resources Laboratory.

An application of the Brogden-Cronback-Gleser total utility analysis to the contribution of the Air Force Officer Qualifying Test in the selection of pilots. This analytic technique allows for the estimation of value contributed both by decreased attrition is training and by increased productivity on the job. The technique was applied to a sample of 1,054 pilot trainees who attended training during 1980-1981. The estimated average utility per graduate from training ranked from $13,000 to $120,000 (approximately), depending upon the selection ratio. Based upon the historical selection ratio, the estimated utility was $71,605. Applying that figure to the expected five year period of service for a new pilot the total monetary value of the AFOQT for one year was over one hundred million dollars ($71,000 X 1,423 graduates).

210. Robertson, D. W. (1975). Prediction of naval aviator career motivation and job satisfaction from the Strong Vocational Interest Blank. Dissertation Abstracts, 35, (8-B), 4244.

Developed special scales from the Strong Vocational Interest Blank to predict long-term retention of naval aviators. Scales retained their relationship to the criterion upon cross-application.

211. Roscoe, S. N., & North, R. A. (1980). Prediction of pilot performance. In S. N. Roscoe (Ed.), Aviation Psychology. Ames, Iowa: Iowa State University Press.

Points out the historically low correlations between selector instruments and measures of pilot performance at the later stages of training. Identifies some attributes considered important to effective flight crew performance and outlines experiments conducted at the Aviation Research Laboratory of the University of Illinois to improve prediction of performance. Measures included time-sharing and dual-task performance. Findings of individual differences in these measures are reported; however no data on their relationships with pilot performance measures are given.

212. Rossander, P. (1980). Personality inventories and prediction of success in pilot training: the state of the art (Working Paper 80-10). Willowdale, Ontario: Canadian Forces Personnel Applied Research Unit.

A survey of the literature from 1917 to 1978 using personality inventories in the prediction of pilot training performance. The study cites 66 references. Some validity data from the cited studies are included.

213. Roth, J. T. (1980). Continuation of data collection on causes of attrition in initial entry rotary wing training. Valencia, PA: Applied Science Associates.

In this study of causes of attrition in U. S. Army Initial Entry Rotary Wing (Helicopter) training, a battery of tests was administered to matched samples of attrite (N=198) and non-attrite (N=212) subjects. Significant differences were found on three of the 16 scales of the Cattell 16PF (Assertiveness, Suspiciousness, and Practical/Imaginative), and a near significant difference on the Surgency Scale. The study also reports that the Strong-Campbell Interest Inventory was administered to the same samples, but the results of that administration are not given.

214. Ryder, L. A. (1978). Aircrew selection. (paper presented at the Air Training Symposium, 8-12 May 1978) Canberra, Australia: Royal Australian Air Force Psychology Service, Department of Defence (Air Force Office).

Provides an overview of research conducted on selection of Royal Australian Air Force pilots, navigators, and air electronics officers. Descriptions of the tests comprising the selection batteries are provided, along with charts indicating that many of the tests correlate significantly with training outcomes. However, specific validity coefficients are not given.

215. Sanders, J. H., Valentine, L. D., & McGrevy, D. F. (1971). The development of equipment for psychomotor assessment (AFHRL-TR-71-40). Lackland Air Force Base, TX; Air Force Human Resources Laboratory.

This report describes the development of two psychomotor coordination tests in a computer-based format. These tests were the Complex Coordination Test and the Two-Hand Coordination Test, modeled after their World War II namesakes. The Complex Coordination Test was a compensatory tracking task using both footpedals and a large, floor-mounted joystick. The Two-Hand Coordination Test was a pursuit tracking task in which the subject used two desk-mounted joysticks to control the left-right and up-down movements of a cursor while tracking a target which moved about the screen in a circle. Normative data from an initial administration of the tests and intercorrelations of the tests scores with subscores from the Air Force Officer Qualifying Test are given.

216. Sanders, M. G., Owens, F., Petho, F. & Kantor, J. E. (1982). Aviator selection: a tri-service review. Paper presented at the National Security Industrial Association Conference, (4-6 May 1982) San Antonio, TX.

A review of aviation selection research underway at the Army, Navy, and Air Force research laboratories. The report includes analyses of causes for attrition from training for each of the services and descriptions of the tests currently under examination as possible selectors.

217. Schvaneveldt, R. W., Breen, T. J., Cooke, N. M., Durso, F. T., Goldsmith, T. E., Tucker, R. G., & DeMaio, J. C. (1984). Cognitive organization as a function of flying experience (AFHRL-TP-83-64). Williams Air Force Base, AZ: Operations Training Division, Air Force Human Resources Laboratory. (AD-A141 767)

Used multidimensional scaling technique and general weighted networks to define cognitive structures of critical flight information used by pilots. Differences were found between

instructors and student pilots, and individual differences. Applications to training and selection are discussed.

218. Science-3 (Royal Air Force) (1983). An improved method of pilot selection (CS (RAF) Report No. 144). London, England: Ministry of Defence.

(The distribution of this document has been restricted by the releasing agency. No data may be abstracted for public release. Consult the releasing agency for further information.)

219. Sells, S. B. (1955). Development of a personality test battery for psychiatric screening of flying personnel. Journal of Aviation Medicine, 26, 35-45.

Describes a large, long-term research project to develop procedures for the screening of pilot trainees. The emphasis in this effort is on the development of personality and interest measures and their evaluation against performance in three stages of the pilot's career: training; post-training operational experience; and, combat experience (Korea). The criterion measures (particularly from training) are termed "purified pass/fail" as an attempt has been made to evaluate the causes for attrition, particularly with respect to failures for lack of adjustment. The report indicates that over 150 separate instruments were under evaluation. Some data indicating validity for certain of the tests are included.

220. Sells, S. B. (1956). Further developments on adaptability screening of flying personnel. Journal of Aviation Medicine, 27, 440-451.

A further description of the extensive studies of personality variables and their relationship to pilot performance. Of 75 tests which had been evaluated, positive results had been found for 26, with significant validity coefficients ranging from .10 to .45. Validities for the specific tests are not provided, however they are categorized and listed as:

Inventory-Type Questionnaires
- Cornell Index
- Personal Inventory
- Minnesota Multiphasic Personality Inventory

Word Association Tests
- Cornell Word Form
- Emotional Word Associations

Perceptual Performance Tests
- Gottschaldt Figures
- Hidden Objects
- McKinney Counting Test

Opinion-Attitude Questionnaire
- School of Aviation Medicine (SAM) Pilot Questionnaire

Annoyance Test
Empathy Test
Optimism Rating of Own Performance
Tendency to Disagree
Authority Submission

Intellectual and Clerical Performance Tests
Number Series Completion
Index of Carefulness of Classification
Rapid Calculation
Letters Comparison
Memory

Motor Performance Tests
Maze Tracing
Tempo of Arm-Shoulder Movement

Projective Techniques
SAM Sentence Completion Test
SAM Group Ink-Blot Test
SAM Personality Sketch Test

Biographical Inventory
SAM Personal History and Background Information

The study also reports correlations of 0.37 to 0.41 with a purified pass/fail criterion for the Personal History and the Background Information Inventory and correlations ranging from 0.10 to 0.40 for the MMPI scales.

Efforts to predict later performance from assessments to adaptability to flying training are included. Three measures of adjustment taken from training criteria and clinical assessments of adjustment were found to correlate significantly (r = .11 to .14) with the adaptability criterion. In addition, several clinical ratings and ratings made by line personnel were found to correlate significantly with ratings of adjustment to combat in Korea made by superior officers and fellow officers in the same squadron.

221. Sells, S. B., & Trites, D. K. (1957). Psychiatric screening of combat pilots: correction of the record. U. S. Armed Forces Medical Journal, 8, 1821-1824.

A rejoinder to Sparks & Niess (1957) who appear to have made serious errors in the interpretation of data regarding relationships between early and late predictions of combat adjustment and combat performance.

222. Sells, S. B., Trites, D. K., Templeton, R. C., & Seaquist, M. R. (1958). Adaptability screening of flying personnel: cross validation of the personal history blank under field conditions. Washington, DC: Proceedings of the 29th Annual Meeting of the Aero Medical Association.

This study reports on the cross-validation of the Personal History Blank. A correlation of 0.44 was obtained between an Aviation Interest scale derived from the Personal History

Blank and a "purified" pass/fail criterion (as compared with a correlation of 0.34 for undifferentiated pass/fail) for 384 aviation cadets and 66 officers. Application of the key to 2,070 trainees (principally officers) tested at Lackland Air Force Base, Texas, resulted in a correlation with pass/fail of 0.23.

223. Shanahan, F. M., & Kantor, J. E. (1986). Basic Navigator Battery: An experimental selection composite for undergraduate navigator training (AFHRL-TR-86-3). Brooks Air Force Base, TX: Manpower and Personnel Division, Air Force Human Resources Laboratory. (AD-A168 857)

An evaluation of an experimental multi-test battery for the selection of Air Force navigators. Two tests were found to correlate significantly with training performance criteria and one of the tests (Pre-Nav contributed significantly to the validity of the Air Force Officer Qualifying Test (the operational screening instrument).

SAMPLE: N = 544; United States; Air Force Navigators

CRITERION: Pass/Fail; Training

PREDICTOR	CRITERION CORRELATION
AF Officer Qualifying Test	
Pilot Composite	.16
Nav-Tech Composite	.17
Academic Composite	.16
Verbal Composite	.10
Quantitative Composite	.19
Experimental Battery	
Pre-Nav Test	.25
Information Processing Test	.14
Obstacles & Remedies	.17
Simulation Navigation Mission	.21
Rotated Letters	.02

224. Shannon, R. H., & Waag, W. L. (1972). Prediction of fleet success from performance on selected maneuvers in naval air training. Proceedings of the 80th Annual Convention of the American Psychological Association, 619-620.

An examination of the relationships between measures taken from flight training and operational performance. For a sample of 48 naval aviators, grades from various stages in flight training were correlated with ratings from squadron leaders and with the occurrence of critical incidents (accidents, etc.). No relationship was found between the ratings and training performance, however some significant correlations were found between the critical incidents and performance during the last (replacement air group) stage of training.

SAMPLE: N = 48; United States; Navy

CRITERION: Critical Incidents; Post-Training

PREDICTOR	CRITERION CORRELATION
Primary	
Familiarization	-.10
Basic	
Familiarization	-.06
Field Mirror Landing Practice/ Carrier Qualification	-.01
Advanced	
Familiarization	.04
Field Mirror Landing Practice/ Carrier Qualification	-.10
Replacement Air Group	
Familiarization	-.32
Field Mirror Landing Practice/ Carrier Qualification	-.28
Tactics	-.09
Weapons Systems	-.31

225. Shipley, B. D. (1983). Maintenance of level flight in a UH-1 flight simulator as a predictor of success in Army flight training. Unpublished manuscript. Fort Rucker, AL: United States Army Research Institute.

Describes the results obtained from an evaluation of the Performance-Based Aviator Selection System (PASS)--a job-sample test conducted in a helicopter simulator. Measures taken from the first hour of the job-sample during which the student was required to hold straight-and-level flight were estimated to correlate from .26 to .37 with a pass/fail criterion for a sample of 223 officers and 231 warrant officer candidates.

226. Shipley, B. D. (1984). Productivity and difficulty as new criteria for validating aviator selection tests. In Proceedings of the Human Factors Society - 28th Annual Meeting.

Points out the limitations of using pass/fail as a criterion in evaluating selection tests and proposes the use of alternative criteria. The characteristics of a criterion measure based upon cumulative flight time are discussed and the results of analyses conducted using that metric are compared to the traditional pass/fail approach.

227. Shoenberger, R. W., Wherry, R. J., & Berkshire, J. R.(1963). Predicting success in aviation training (Report No. 7). Pensacola, FL: U. S. Naval School of Aviation Medicine.

Describes a system for the prediction of training success/failure at multiple points prior to and during training. Initial predictions are based upon data available prior to training (test scores, biodata, etc.), with each subsequent prediction including all the predecessor data plus any new data available from training (such as pre-solo grades, etc.). Multiple tables are presented with give the correlations of available predictors at each stage (every one to three weeks, typically) with eventual pass/fail for samples of 820 non-officers and 766 officers. Multiple correlations range from .31 to .45 (cross-validated range .30 to .44) for early to late, respectively, predictions for non-officers, with similar results for officers.

SAMPLE: N = 820 (A), 766 (B); United States; Navy

CRITERION: Pass/Fail; Training

PREDICTOR	CRITERION CORRELATION Sample A Non-officers	Sample B Officers
(Week One)		
Aviation Qualification Test	.22	.14
Mechanical Comprehension Test	.20	.24
Spatial Apperception Test	.27	.16
Biographical Inventory	.12	.10
Age	.09	---
Education	.13	---
Math Test	.17	.10

228. Shull, R. N., & Dolgin, D. L. (1989). Personality and flight training performance. In Proceedings of the Human Factors Society--33rd Annual Meeting.

Administered a risk-taking test and a personality inventory (Pilot Personality Questionnaire) to samples of student naval aviators (SNA) and naval flight officers (NFO; non-pilots) in a computer-based format. Some indications of validity for the risk taking test were obtained, however incomplete results are reported for the personality inventory based upon samples of less than 50 cases.

SAMPLE: N = various; United States; Navy

CRITERION: Pass/Fail; Primary Training

PREDICTOR	GROUP	N	CRITERION CORRELATION
Risk Test Number Right	SNA	322	.132
Risk Test Reaction Time	SNA	322	-.184

Risk Test Number Right	NFO	77	.277
Risk Test Reaction time	NFO	77	-.447

229. Shull, R. N., Dolgin, D. L., & Gibb, G. D. (1988). The relationship between flight training performance, a risk assessment test, and the Jenkins Activity Survey. (NAMRL-1339). Pensacola, FL: Naval Aerospace Medical Research Laboratory.

Administered a risk-taking test and the Jenkins Activity Survey (JAS-C) to 440 student naval aviators. One of the six scores from the risk-taking test was significantly correlated with a pass/fail criterion. None of the scores from the JAS-C were related to the criterion.

SAMPLE: N = 217 (A), 149 (B); United States; Navy

CRITERION: Pass/Fail; Primary Training

PREDICTOR	CRITERION CORRELATION
Risk Taking (N = 217)	
Reaction Time - 1	.092
Reaction Time - 2	.131
Reaction Time - 3	.011
Number Right - 1	-.184
Number Right - 2	-.064
Number Right - 3	-.023
JAS-C (N = 149)	
Scale A	-.001
Scale S	-.030
Scale J	.105
Scale H	.152

230. Siem, F. M. (1988). Personality characteristics of USAF pilot candidates. Proceedings of the 1988 AGARD Meeting on Aircrew Performance. Paris:

Performed a factor analysis of the Automated Aircrew Personality Profiler (AAPP) which consists of 202 items representing scales from the MMPI, the State-Trait Anxiety Inventory, the Personal Orientation Inventory, the Interpersonal Behavior Scale, and the Jenkins Activity Survey. Sixteen scale scores from the AAPP were factor analyzed using principal components analysis and oblique rotation. Five factors were identified, and scores for each of those factors were generated and correlated with two training performance criteria: pass/fail and advanced training recommendation.

SAMPLE: N = 325 (A), 224 (B); United States ; Air Force

CRITERION: Pass/Fail (A),
Advanced Training Recommendation (B); Training

PREDICTOR	CRITERION CORRELATION Sample A N=325	Sample B N=224
Personality Factor Score		
Hostility	-.12	.01
Self-Confidence	.13	-.01
Values Flexibility	.12	.10
Depression	-.10	-.03
Activity Level	-.02	.00

231. Siem, F. M., Carretta, T. R., & Mercatante, T. A. (1987). Personality, attitudes, and pilot training performance: Preliminary analysis (AFHRL-TP-87-62). Brooks Air Force Base, TX: Manpower and Personnel Division, Air Force Human Resources Laboratory.

Data presented in this report essentially duplicate that described earlier for Carretta & Siem (1988).

232. Signori, E. I. (1949). The Arnprior Experiment: a study of World War II pilot selection procedures in the RCAF and RAF. Canadian Journal of Psychology, 3, 136-150.

Describes the selection and training of Royal Canadian Air Force and Royal Air Force pilots at Arnprior, Ontario during World War II.

SAMPLE: N = 366; Canada; Royal Canadian Air Force

CRITERION: Pass/Fail; Training

PREDICTOR	CRITERION CORRELATION
Mental Ability	.06
Mechanical Reasoning	.21
Sound Pattern Discrimination	.07
Mathematics & Physics Proficiency	.14
Practical Mechanical Ability	.17
Aircrew Information (Bio-data)	.14
Aircrew Interview (Motivation)	06
Visual Link Test	.41
RAF Grading 7 hrs.	.44
RAF Grading 11 hrs.	.39
Instructor Ratings after 1 1/2 hrs	.23
after 3 hrs	.34
after 5 hrs	.35
after 7 hrs	.40
after 11 hrs	.41

233. Sparks, B. W., & Niess, O. K. (1956). Psychiatric screening of combat pilots. U. S. Armed Forces Journal, 7, 811-816.

Compares predictions of combat proficiency or adaptation made by combat psychologists with those made by training psychologists. Concludes that only the former can make accurate evaluations. [However, see rebuttal by Sells & Trites; 1957]

234. Spinner, B. Using the Canadian automated pilot selection system to predict performance in primary flying school: Derivation and cross-validation. (Working Paper 89-8). Willowdale, Ontario: Canadian Forces Personnel Applied Research Unit.

This report describes the validation of the Canadian Automated Pilot Selection System (CAPSS). This system gathers performance data from a light plane simulation, similar to that developed by Long and Varney (1975). Correlations between an overall CAPSS measure and flying training performance are given.

(The distribution of this document has been restricted by the releasing agency. No data may be abstracted for public release. Consult the releasing agency for further information.)

235. Spinner, B. Using the Canadian automated pilot selection system to predict performance in primary flying school: Straight and level flight. (Technical Note 15/88). Willowdale, Ontario: Canadian Forces Personnel Applied Research Unit.

(The distribution of this document has been restricted by the releasing agency. No data may be abstracted for public release. Consult the releasing agency for further information.)

236. Steininger, K. (1964). Psychological factors in the training of student pilots. In A. Cassie, S. D. Fokkema, & J. B. Parry (Eds.), Aviation Psychology. The Hague: Mouton.

237. Stoker, P. (1982). An empirical investigation of the predictive validity of the defence mechanism test in the screening of fast-jet pilots for the Royal Air Force. Projective Psychology, 27, 7-12.

Describes the general content of the defence mechanism test (DMT) and attributes its development to Ulf Kragh at the University of Lund, Sweden. The use of the DMT in pilot selection research in the Royal Swedish Air Force is described and an overall validity coefficient against an adaptation criterion is estimated as around .50. Two

studies of the DMT with Royal Air Force pilot are reported. In the first study (N=50) a point-biserial correlation of .19 was obtained between mean DMT standard scores and pass/fail in basic flying training. However, at a later stage in training (tactical weapons training) the correlation was -.26. For a second sample (N=128), the correlation between mean DMT standard scores and pass/fail in basic flying training was .07.

238. Stoker, P., Hunter, D. R., Kantor, J. E., Quebe, J. C., & Siem, F. M. (1987). Flight screening program effects on attrition in undergraduate pilot training (AFHRL-TP-86-59). Brooks Air Force Base, TX: Manpower and Personnel Division, Air Force Human Resources Laboratory.

An evaluation of the Air Force Flight Screening Program (FSP; light-plane) which assessed both training affect and selection utility. Several groups of candidates were given variations on the basic FSP ranging from extended FSP to no FSP. In addition, certain candidates were admitted to pilot training regardless of their performance during FSP.

SAMPLE: N = 514; United States; Air Force

CRITERION: Pass/Fail; Training

PREDICTOR	CRITERION CORRELATION
Flight Screening Program	
Sum of All Grades	.27
Flight 8	.27
Flight 9	.16
Flight 10	.10
Flight 11	.20
Flight 12	.29

239. Stratton, G. M., McComas, H. C., Coover, J. E., & Bagby, E. (1920). Psychological tests for selecting aviators. Journal of Experimental Psychology, 3, 405-423.

Describes "Examination 609" which was used for the selection of pilot trainees by the United States Army during World War I and which included measures of visual acuity, color vision, balance of the ocular muscles, normality of the semicircular canals, hearing acuity, and some general ability tests. Research utilizing other tests, such as judgement of curves, judgement of relative speeds, complex reaction time, and muscle strength and endurance is described. Correlations between the various tests and training performance are given.

240. Taylor, C. W., Murray, S. L., Ellison, R. L., & Majesty, M. S. (1971). Development of motivation assessment techniques for Air Force officer training and education programs: motivation for pilot training (AFHRL-TR-71-21). Brooks Air Force Base, TX: Professional Education Division, Air Force Human Resources Laboratory.

Describes the development of two biographical inventories and an activities index. These instruments were administered to 645 students scheduled for pilot training while undergoing training at the USAF Officer Training School. A priori key scores from the biographical inventories were found to correlate significantly with a pass/fail in pilot training criterion for only one of the four keys. The Creativity Key correlated 0.10 with pass/fail. None of the keys correlated significantly with a criterion of success versus Self-Initiated Elimination (SIE). Of the 30 Activities Index Need Scores, only 5 correlated significantly with the pass/fail criterion, and 5 correlated significantly with the Pass/SIE criterion. Those scales which predicted both criteria were: (1) Energy; (2) Harm Avoidance; and, (3) Sensuality. These correlations ranged from 0.09 to 0.18. An Audacity measure was the only one of 12 Activities Index Factor Scores to correlate significantly with either of the two criteria. In addition to using the a priori keys, they also divided their sample and developed empirical keys for a number of criteria. Application of these keys to the cross-validation sample yielded a correlation of 0.26 between a pass/fail criterion and a key developed to predict the pass/SIE criterion. The pass/SIE key score correlated 0.32 with the pass/SIE criterion in the cross-validation sample. Additional keys were developed from items contained in the existing Air Force Pilot Biographical Inventory and Officer Biographical Inventory. The Total Attrition Key score was found to correlate 0.22 with pass/fail in the cross-validation sample.

241. Taylor, C. W., Murray, S. L., Hornick, C. W., Ellison, R. L., & Majesty, M. S. (1973). Assessing motivation for flying (Report FOD-1). Lackland Air Force Base, TX: USAF School of Military Science.

Used biodata collected from questionnaires to identify dropouts (self-initiated elimination) from pilot training. Multiple versions of questionnaires (contents are not precisely described) were evaluated for prediction of motivational criteria in non-aviation settings and for prediction of aviation dropouts. Both a priori and empirically derived keys were used. The authors indicate that significant relationships between one or more of their keys and dropout were obtained, however because of the way it is reported, it is difficult to assess their results. No validity coefficients are reported.

242. Torrance, E. P. (1954). The development of a preliminary life experience inventory for the study of fighter interceptor pilot combat effectiveness (AFPTRC-TR-54-89). Lackland Air Force Base, TX: Air Force Personnel & Training Research Center.

Based upon interviews with fighter aces and stories of aces, developed a series of hypotheses regarding the characteristics of successful pilots and constructed biodata inventories which contained items related to those hypotheses. Inventories were administered to 31 fighter aces and 72 nonaces. Scores for 12 a priori scales were generated, and an empirical scoring key was also developed based upon the responses of a separate sample of fighter and nonfighter pilots. Intercorrelations of the scales scores are given, however no direct comparison of the scores of the aces and nonaces is provided. It is noted that results from the use of the scales with different groups of pilots would be presented in a separate report [I have been unable to find it, however. DRH]. All the questions comprising the inventory are included in an appendix.

243. Trankell, A. (1959). The psychologist as an instrument of prediction. Journal of Applied Psychology, 43, 170-175.

Reports on the selection of Scandinavian Airlines System (SAS) pilots, and the use of standardized tests as compared to clinical assessments. Psychologists employed by SAS gave a series of standardized test to entering pilots and, using both the test results and their clinical impressions of the pilots performances as they took the tests, produced assessments of five variables. Combining these assessment measures into a stanine gives a biserial correlation between the criterion of remaining/dismissed of .75.

SAMPLE: N = 363; Scandinavia; Civilian

CRITERION: Retained/Dismissed; Training

PREDICTOR	CRITERION CORRELATION	
	TEST	ASSESSMENT
Simultaneous Capacity	.42	.55
Inductive Intelligence	.33	.40
Verbal Intelligence	.28	.32
Mechanical Comprehension	.21	.30
Sensitivity	-.07	-.21

244. Trites, D. K., & Kabula, A. L. (1957). Characteristics of successful pilots. Journal of Aviation Medicine, 28, 34-40.

Utilized two criteria for success as a pilot: a score based upon an evaluation of the pilot's military history as

reflected in his Form 66 (personnel record); and, two measures of combat flying performance--total combat hours and average monthly combat hours. Several personality measures and adjustment measures were obtained for samples of pilots. Sample sizes ranged from 35 to over 400. Significant correlations were obtained between several of the personality measures and the Form 66 score, with a few significant correlations between the measures and the combat criteria.

245. Trites, D. K., & Sells, S. B. (1957). Combat performance: measurement and prediction. Journal of Applied Psychology, 41, 121-130.

Describes a project to evaluate the measurement of combat performance and the prediction of that performance by measures taken during flight training. Various measures obtained of combat performance, such as total combat flying time, peer-superior ratings, and psychologists' ratings are described, along with the measures obtained during flight training (primarily pilot stanine, peer-superior ratings and psychologists' ratings). Characteristics of the performance criteria are discussed, and correlations of the criteria with the training measures are given (generally nonsignificant).

246. Tucker, J. A. (1954). Use of previous flying experience as a predictor variable (AFPTRC-TR-54-71). Lackland Air Force Base, TX: Air Force Personnel & Training Research Center.

This study examined the contribution of a flying experience measure to the prediction of a training criterion (pass versus elimination for flying deficiency). The study examined both the existing system of arbitrary increments to the pilot stanine based upon level of experience and an experimental system in which quantified measure of experience were added to the regression equations. The quantified measure was found to be superior to the traditional system. In addition, the contribution of previous flying experience was found to overlap the variance contributed by two existing selection battery tests--General Information and Rudder Control--such that little additional contribution was made to prediction. In the absence of those two tests, however the flying experience measure made a significant contribution to the prediction of the training criterion.

SAMPLE: N = 1511; United States; Air Force

CRITERION: Pass/Fail for Flying Deficiency; Training

PREDICTOR	CRITERION CORRELATION
Previous Flying Experience (Dichotomous variable)	.36

Biographical Data	.27
General Information	.45
Mechanical Principles	.28
Complex Coordination	.32
Rudder Control	.46

247. Valentine, L. D., & McGrevy, D. F. (1971). Validation of a pilot psychomotor selection battery. Proceedings of the 13th Annual Meeting of the Military Testing Association.

Describes the Two-Hand Coordination Test and the Complex Coordination Test implemented in a computer-based testing format. Data are presented for validation of the tests on two groups of pilot trainees. [These data are also reported by McGrevy & Valentine (1974) and will not be duplicated here. DRH]

248. Viteles, M. S. (1945). The aircraft pilot: 5 Years of research. A summary of outcomes. Psychological Bulletin, 42, 489-526.

Describes an extensive research effort conducted by the Civil Aeronautics Authority and its contribution to the development of the military pilot selection program. A wide range of tests that were developed and evaluated including general intelligence tests, personality, coordination, aviation classifications tests, and mechanical comprehensive tests are described. No validity coefficients are reported.

249. Voas, R. B. (1959). Vocational interests of naval aviation cadets: final results. Journal of Applied Psychology, 43, 70-73.

Used the Kuder Preference Record: Vocational, Form BM (KPR) as an indicator of the vocational interests of naval aviation cadets. For 605 naval aviation cadets a biserial correlation of only 0.17 between the voluntary withdrawal (VW) scale and a successful/withdrawal criterion was found. While that correlation was significant, it showed a dramatic shrinkage from that found in the original standardization group. While the VW scale also showed significant differences between the successful group and a total elimination group, when differences in mechanical ability were held constant, that difference became non-significant. The authors concluded that the validity of the KPR was largely due to its relationship to measures of mechanical ability,and that "...the vocational interests measured by this inventory do not have an important relationship to success in flight training...". (p. 73)

SAMPLE: N = 605; United States; Navy

CRITERION: Pass/Fail; Training

PREDICTOR	CRITERION CORRELATION
Kuder Preference Record Voluntary Withdrawal Scale	.17

250. Voas, R. B., Bair, J. T., & Ambler, R. K. (1956). Relationship between behavior in a stress situation and later separation from flight training with expressed anxiety toward flying. Psychological Reports, 2, 393-397.

Describes a study which assessed the capacity of aviation cadets to deal with stress under realistic conditions. While undergoing altitude chamber training, cadets were required to remove their masks to experience the effects of high altitude, but could, if they wished, replace their masks before the end of the exercise. The incidence of replacing their masks was taken as an indicator of low stress tolerance, along with the cadets' reports of "ear-blockage" during the descent phase of the exercise. On a sample of 1540 cadets, significantly more of those who withdrew from flying training because of anxiety had anxiety reactions in the decompression chamber than of those who completed training.

251. Want, R. L. (1962). The validity of tests in the selection of Air Force pilots. Australian Journal of Psychology, 14, 133-139.

This is a brief history of aircrew selection for the Royal Australian Air Force and a description of all the tests used in the selection process. Reports both uncorrected and corrected validities of tests for two training criteria. Overall multiple correlation of the test battery was .63 with a pass/fail criterion.

SAMPLE: N = 117; Australia; Royal Australian Air Force

CRITERION: Pass/Fail; Training

PREDICTOR	CRITERION CORRELATION (Corrected for Range Restriction)
Dial Reading	.27
Instrument Comprehension	.46
Silhouettes	.25
General Information	.28
Complex Coordination	.31
Verbal Intelligence	-.11
General Mathematics	.23
General Science	.27

252. Williams, G. O. (1940). Flying aptitude tests (Report No. 152). London, England: Flying Personnel Research Committee, Royal Air Force, Ministry of Defence.

Provides data on the validity of the Sensory Motor Apparatus (SMA) test for the selection of pilots by comparing groups of failures and graduates from pilot training. Significant differences were found between mean test scores for the two groups.

253. Youngling, E. W., Levine, S. H., Mocharnuk, J. B., & Weston, L. M. (1977). Feasibility study to predict effectiveness for selected military roles: fighter pilot effectiveness (MDC E1634). St. Louis, MO: McDonnel Douglas Astronautics Company - East.

Examines the feasibility of predicting fighter pilot effectiveness based upon measures such as selection test scores and training performance. Proposes an extensive test battery be established for the prognostication of combat performance. Three general classes of measures proposed are: situational tests and peer rating; apparatus and combat job sample tests; and paper-and-pencil selection tests. Cites other studies which have correlated various measures with combat kill criteria. Correlations as high as .15 to .20 are reported for some selection measures. An extensive survey of the literature on aircrew selection and air combat performance is provided.

254. Youngling, E. W., Levine, S. H., Mocharnuk, J. B., & Weston, L. M. (1977). Notes on the feasibility of predicting fighter pilot effectiveness. Proceedings of the 19th Annual Meeting of the Military Testing Association.

A brief synopsis of the Youngling, et al. (1977) report described above.

AUTHOR INDEX

APPENDIX A. RESEARCH ORGANIZATIONS AND SOURCES

In order to facilitate access to the primary sources abstracted in this report, the addresses of the organizations primarily responsible for aircrew selection research in the United States and abroad are provided here. For the most part, technical reports produced by the United States military services are available from the National Technical Information Service or the Defense Documentation Center (for members or employees of the military services). Reports produced by contractors are often available directly from the contractor, or from the governmental agency that sponsored the research. Most of the services also maintain technical libraries, through which references might be obtained via interlibrary loan.

UNITED STATES ARMY

U.S. Army Research Institute for the Behavioral and Social Sciences
ATTN: PERI-IR
Fort Rucker, AL 36362-5000

UNITED STATES NAVY

Naval Aerospace Medical Research Laboratory
Naval Air Station
Pensacola, FL 32508-5700

UNITED STATES AIR FORCE

Manpower and Personnel Division
Air Force Human Resources Laboratory
ATTN: AFHRL/MO
Brooks AFB, Texas 78235

Operations Training Division
Air Force Human Resources Laboratory
ATTN: AFHRL/OT
Williams AFB, AZ 85224

AUSTRALIA

Defence Force Recruiting Centre
RAAF Psychology Section
332 St. Kilda Road
Melbourne 3004

CANADA

Canadian Forces Personnel Applied Research Unit
4900 Yonge Street
Willowdale, Ontario M2N 6B7

NEW ZEALAND

Directorate of Personnel Research & Psychological Services
Personnel Branch
Defence Headquarters
Wellington

UNITED KINGDOM

Ministry of Defence
Science 3b(Air)
Lacon House
Theobalds Road
London WC1 8RY

Ministry of Defence
Senior Psychologist (N)
Room 430, Archway Block South
Old Admiralty Building, Spring Gardens
London SW1A 2BE

Army Personnel Research Establishment
C/O Royal Aerospace Establishment
Farnborough, Hampshire

APPENDIX B. PREDICTION MEASURE CATEGORIES

Table 1
Aircrew Selection Literature Reviews

Alcock, 1981
Bache, Bradshaw, Cook, & Hobgood, 1978
Belgian Air Force, 1983
Burke, 1987
Burwell, 1957
Dockeray & Isaacs, 1921
Dolgin & Gibb, 1988
Ericksen, 1952
Flanagan, 1948
Flanagan, 1942
Griffin & Mosko, 1977
Guilford & Lacey, 1947
Hunter, 1987
Hunter, 1989
Imhoff & Levine, 1981
Ingram, 1968
Jones, 1983
Jones , 1988
Kantor, 1984
Kantor & Bordelon, 1985
Levine & Tupes, 1952
Melton, 1947
Mixon, 1974
North & Griffin, 1977
Parry, 1947
Passey & McLaurin, 1966
Razran & Brown, 1941
Roscoe & North, 1980
Ryder, 1978
Viteles, 1945
Youngling, Levine, Mocharnuk, & Weston, 1977

Table 2
Paper-and-Pencil General Ability Measures

Ambler, 1959
Ambler, Bair, & Wherry, 1960
Army Air Force, 1944
Bair, Lockman, & Martoccia, 1956
Berkshire, 1967
Booth & Peterson, 1968
Bordelon & Kantor, 1986
Brown, Dohme, & Sanders, 1981
Cassie, 1956
Cassie, 1960
Cassie, 1962
Cassie, 1964
Cassie, 1967
Croll, Mullins, & Weeks, 1973
Dudek, 1949
Elliott, 1982
Fiske, 1947
Flanagen, 1942
Fleishman, 1954
Gordon, 1949
Greene, 1947
Guilford & Lacey, 1947
Hertli, 1982
Hulin & Alvares, 1971
Hunter & Thompson, 1978
King, 1945
Knight, 1978
Koonce, 1981
Lane, 1947
Levine & Tupes, 1952
Lyon, 1951
McMullen & Eastman, 1973
Mullins, Keeth, & Riederich, 1968
Peterson, Booth, Lane, & Ambler, 1967
Shanahan & Kantor, 1986
Signori, 1949
Trankell, 1959
Viteles, 1945
Want, 1962

Table 3
Personality, Interest, and Background Information Measures

Ambler, Johnson, & Clark, 1952
Bale & Ambler, 1971
Bale & Waldeisen, 1969
Bartram & Dale, 1982
Bartram & Dale, 1983
Bartram, Dale, & Smith, 1982
Bucky & Spielberger, 1973
Carretta, 1987
Carretta & Siem, 1988
Davis, 1989
Devries, Yakimo, Curtin, & McKenzie, 1975
Dolgin & Gibb, 1988
Dolgin, Shull, & Gibb, 1987
Eastman, Leger, & Shipley, 1977
Feggetter & Hammond, 1975
Fiske, 1947
Fleischman, Ambler, Peterson, & Lane, 1966
Gillespie & Reid, 1945
Gopher, 1982
Gordon, 1949
Greene, 1947
Griffin & Mosko, 1977
Guinn, Vitola, & Leisey 1976
Henmon, 1919
Holtzman & Sells, 1954
Hopkins, 1944
Hopson, Griffin, Lane, & Ambler, 1978
Hunter & Thompson, 1978
Jessup, 1969
Jessup & Jessup, 1971
Joaquin, 1980
Kragh, 1960
Lane, 1947
Levine & Tupes, 1952
Melton, 1954
Missenard, Gelly, Duffault, & Leagre, 1964
Neuman, unknown
Neuman, 1982
Reinhardt, 1970
Robertson, 1975
Rossander, 1980
Roth, 1980
Sells, 1955
Sells, 1956
Sells & Trites, 1957
Sells, Trites, Templeton, & Seaquist, 1958

Table 3 (Continued)

Shull & Dolgin, 1989
Shull, Dolgin, & Gibb, 1988
Siem, 1988
Siem, Carretta, & Mercatante, 1987
Signori, 1949
Sparks & Niess, 1956
Stoker, 1982
Taylor, Murray, Ellison, & Majesty, 1971
Taylor, Murray, Hornick, Ellison, & Majesty, 1973
Torrance, 1954
Trites & Kakula, 1957
Viteles, 1945
Voas, 1959
Voas, Blair, & Ambler, 1956

Table 4
Psychomotor, Perceptual and Information Processing Measures

Army Air Force, 1944
Bair, Lockman, & Martoccia, 1956
Bartlett & Craik, 1939
Bartram, 1986
Bartram, 1988
Bartram & Choi, 1988
Bartram, Corkindale, & Dennison, 1985
Bartram, Dale, & Smith, 1982
Berkshire & Ambler, 1969
Bordelon & Kantor, 1986
Burke, 1980
Carretta, 1986
Carretta, 1987 a,b,c,d,e
Carretta, 1988
Carretta, 1989 a,b
Cassie & Anderson, 1966
Cos, 1988
Damos, 1978
Damos & Lintern, 1979
Demaio, 1983
Dewet, 1963
Dockeray & Isaacs, 1921
Dudek, 1949
Eddowes, 1974
Fiske, 1947

Table 4 (Continued)

Fleishman, 1954
Fleishman, 1956
Fowler, 1981
Gopher, 1982
Gopher & Kahneman, 1971
Gopher & North, 1974
Gordon & Leighty, 1988
Greene, 1947
Griffin & McBride, 1986
Griffin, Morrison, Amerson, & Hamilton, 1987
Griffin & Mosko, 1982
Guttmann, Bauer, & Trimmel, 1982
Henmon, 1919
Hopkins, 1944
Hunter, 1977
Hunter, 1982
Hunter & Burke, 1987
Hunter, Maurelli, & Thompson, 1977
Hunter & Thompson, 1978
Imhoff & Levine, 1981
Kantor & Carretta, 1988
King, 1945
Koonce, 1981
Lane, 1947
Lyon, 1951
Mashburn, 1934 (a,b)
McGrevy & Valentine, 1974
McLaurin & Passey, 1967
Mullins, Keeth, & Riederich, 1968
North & Gopher, 1976
North & Gopher, 1974
Rauch, 1980
Rippon & Manuel, 1918
Sanders, Valentine, & McGrevy, 1971
Schvaneveldt, Breen, Cooke, Durso, Goldsmith, Tucker, & DeMaio, 1984
Science-3 (Royal Air Force), 1983
Siem & Carretta, 1986
Signori, 1949
Stratton, McComas, Coover, & Gagby, 1920
Trankell, 1959
Valentine & McGrevy, 1971
Viteles, 1945
Want, 1962
Williams, 1940

Table 5
Job Sample and Light Plane Measures

Ambler & Waters, 1967
Baxter, 1978
Berkshire & Ambler, 1963
Boyle & Hagin, 1953
Cox & Mullins, 1959
Elshaw & Lidderdale, 1982
Flyer & Bigbee, 1954
Goebel, Baum, & Hagin, 1971
Hill & Goebel, 1971
Hunter & Thompson, 1978
Ingram, 1968
LeMaster & Gray, 1974
Levine & Tupes, 1952
Lidderdale, 1976
Long & Varney, 1975
Mullins & Cox, 1960
Rauch, 1980
Signori, 1949
Stoker, Hunter, Kantor, Quebe, & Siem, 1987

Table 6
Physiological Measures

Graybiel & West, 1945
Lewis & Rimland, 1979
Prestrude, 1987
Viteles, 1945

Table 7
Aircrew Classification

Ambler, Rickus, & Booth, 1970
Bache, Bradshaw, Cook, & Hobgood, 1978
Bale, Rickus, & Ambler, 1973
Dohme, 1979
Dohme & Sanders, 1979
Gopher & Kahneman, 1971
Intano & Lofaro, 1988
Jones & McAnulty, 1984
Miller, 1974
Miller, Eschenbrenner, Marco, & Dohme, 1981
Myers, Schemmer, & Fleishman, 1983
Youngling, Levine, Mocharnuk, & Weston, 1977 (a,b)

Table 8
Aircrew Performance Measurement

Dudek, 1949
Ericksen, 1952
Fleishman & Ornstein, 1960
Henmon, 1919
Hill & Goebel, 1971
Krumboltz & Christal, 1957
Meyer, Laveson, Weissman, & Eddowes, 1974 (a,b,c,d)
Meyer, Laveson, Paper, & Edwards, 1978
Mixon & Moroney, 1982
Razran & Brown, 1941
Signori, 1949
Stratton, McComas, Coover, & Bagby, 1920
Viteles, 1945

Table 9
Psychometric Evaluations of Selection Tests

Alvares, 1971
Dudek, 1949
Eastman & McMullen, 1976
Hulin & Alvares, 1971
Michael, 1947

APPENDIX C. SIGNIFICANCE LEVELS OF CORRELATION COEFFICIENTS

Significance Levels of Correlation Coefficients

Correlation coefficients significant at the .05 and .01 levels.

N	r(.05)	r(.01)
10	.576	.708
20	.423	.537
30	.349	.449
40	.304	.393
50	.273	.354
60	.250	.325
70	.233	.302
80	.217	.283
90	.205	.267
100	.195	.254
150	.159	.208
200	.138	.181
300	.113	.148
400	.098	.128
500	.088	.115
1000	.062	.081